

CYBER 170/180 MODELS 845 AND 855 CYBER 180 MODELS 840, 850, AND 860 OPTIONAL EQUIPMENT

AT478-A INPUT/OUTPUT UNIT (IOU NIO)
AT481-A INPUT/OUTPUT UNIT (IOU CIO)
AT478-A/AT481-A (MODIFIED) SECONDARY IOU
AD113-A CENTRAL PROCESSOR (CP-1 FOR 860 SYSTEMS)
AD113-A CENTRAL PROCESSOR (CP-1 WITH EXISTING BS213-A CM FOR 855 SYSTEMS)
GH251-C WATER COOLING UNIT
GH252-A/-C WATER COOLING UNITS
AT490-A INTELLIGENT STANDARD INTERFACE CHANNEL
AT497-A INTELLIGENT PERIPHERAL INTERFACE CHANNEL
AT498-A CYBER® 170 DIRECT MEMORY ACCESS CHANNEL

Installation and Checkout

**CYBER 170/180 models 845 AND 855
CYBER 180 MODELS 840, 850, AND 860
OPTIONAL EQUIPMENT**

Installation and Checkout

Manual History

Revision	Description	Date
01	Initial draft.	(11-06-86)
02	Revised draft.	(11-21-86)
03	Revised draft; supercedes Rev 02.	(12-23-86)
04	Revised entire section 4.	(01-23-87)
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07	Manual reorganized and technical changes added; supercedes Rev 06.	(03-31-87)
08	Manual revised; supercedes Rev 07.	(06-03-87)
09	Add technical review comments; add information about secondary IOU and GH252-C WCU.	(08-20-87)
10	Revised to include manual verification comments	(12-02-87)

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Equipment Supported in This Manual

This manual supports the following equipment at the series levels listed, assuming all field change orders (FCOs) against the equipment have been installed. Compare the list of FCOs in this table with the list in your equipment FCO log. If the two lists match, this manual accurately reflects your equipment.

Equipment	Series	FCOs	Comments
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About This Manual

This manual is intended for use by experienced field personnel who are familiar with CONTROL DATA CYBER 180 computer systems. This manual provides detailed preinstallation, installation, and checkout instructions for the following CDC CYBER 170/180 Models 845 and 855 and Models 840, 850, and 860 optional equipment:

- AT478-A Input/Output Unit (IOU-NIO cabinet)
- AT481-A Input/Output Unit (IOU-CIO cabinet) (IOU NIO/CIO are installed as a unit and replace AB115-A IOU)
- AT478-A/AT481-A Secondary Input/Output Unit (factory-modified and installed as a separate, free-standing unit)
- AD113-A Central Processor (CP-1)
- AT490-A Intelligent Standard Interface (ISI) I/O Channel Option
- AT497-A Intelligent Peripheral Interface (IPI) I/O Channel Option
- AT498-A CYBER 170 Direct Memory Access I/O Channel Option
- GH251-C Water Cooling Unit (shares the cooling load with a GH251-A when more than one WCU is used)
- GH252-A Water Cooling Unit (required for CP-0, CP-1, CM, and IOU if only one water cooling unit is used).

Water cooling Unit (WCU) Capacities:

- GH251-A/B WCU = 50-L/min (14-gal/min)
- GH251-C WCU = 102-L/min (27-gal/min) (60-Hz model)
- GH251-C WCU = 84-L/min (22-gal/min) (50-Hz model)
- GH252-A WCU = 220-L/min (58-gal/min)
- GH252-C WCU = 225-L/min (60-gal/min) (50-Hz model)
- GH252-C WCU = 265-L/min (70-gal/min) (60-Hz model)

Manual Organization

This manual is divided into chapters as follows:

Chapter 1 - Introduction

Chapter 2 - AT478-A and AT481-A Input/Output Unit and Secondary IOU Installation

Chapter 3 - AD113-A Central Processor Installation

Chapter 4 - GH251-A Water Cooling Unit Removal

Chapter 5 - GH251-C Water Cooling Unit Installation

Chapter 6 - GH252-A Water Cooling Unit Installation

Chapter 7 - Channel Options Installation

Chapter 8 - Checkout

Related Manuals

Manuals related to 170/180 CYBER Systems and pertinent to this installation manual are as follows:

Manual	Publication Number
Remote Terminal Assistance Handbook	60000078
CYBER Installation Package Users' Handbook	60457180
MSL 15X Off-line Maintenance Software Library Reference Manual	60456530
Cooling System Hardware Maintenance Manual	60455930
Cooling System Hardware Maintenance Manual	60461610
Power Distribution and Warning System Hardware Maintenance Manual	60456270
845/855 Upgrade Options Installation and Checkout	60462570

Ordering Manuals

You can order Control Data manuals from:

Control Data Corporation
Literature and Distribution Services
308 North Dale Street
St. Paul, Minnesota 55103

Ordering information, prices, and the current revision levels are in the Literature Catalog (publication number 90310500).

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This manual provides preinstallation, installation, and checkout instructions for the CYBER® 170/180 Models 845/855 and CYBER 180 Models 840, 850, and 850 computer system optional equipment (figure 1-1).

Configuration Options

Since the processes of this manual cover the installation of several equipments, it is necessary to establish correct assumptions regarding the configuration of your system early. The following questions are intended to guide you to that beginning point.

1. IS AN AT478-A/AT481-A IOU (NIO/CIO) REPLACING AN EXISTING IOU?
 - If yes, go to question 3.
 - If no, go to question 2.
2. IS A SECOND CENTRAL PROCESSOR (CP-1) BEING ADDED ?
 - If yes, go to question 5.
 - If no, go to question 4.
3. ARE CP-1 AND IOU (NIO/CIO) BEING ADDED SIMULTANEOUSLY FOR THIS UPGRADE?
 - If yes, go to Install AT478-A/AT481-A IOU and AD113-A CP-1 Distilled Water Hoses on 855 (or 860 systems as appropriate) in chapter 5 (covers GH251-C WCUs) OR the parallel procedure in chapter 6 (covers GH252-A/C WCUs) as applicable.
 - If no, go to Install AT478-A/AT481-A IOU Distilled Water Hoses in chapter 5 (covers GH251-C WCUs) or chapter 6 (covers GH252-A/C WCUs) as applicable.
4. IS A SECONDARY IOU BEING ADDED?
 - If yes, go to Install Secondary IOU Distilled Water Hoses in chapter 5 or 6, as applicable.
 - If no, obtain the correct manual for the upgrade to be performed.
5. ARE CP-1 and SECONDARY IOU BEING ADDED SIMULTANEOUSLY FOR THIS UPGRADE?
 - If yes, go to Install Secondary IOU Distilled Water Hoses in chapter 5 or 6, as applicable, AND THEN go to Install AD113-A CP1 Distilled Water Hoses in chapter 5 or 6, as applicable.
 - If no, go to Install AD113-A CP-1 Distilled Water Hoses in chapter 5 or 6, as applicable.

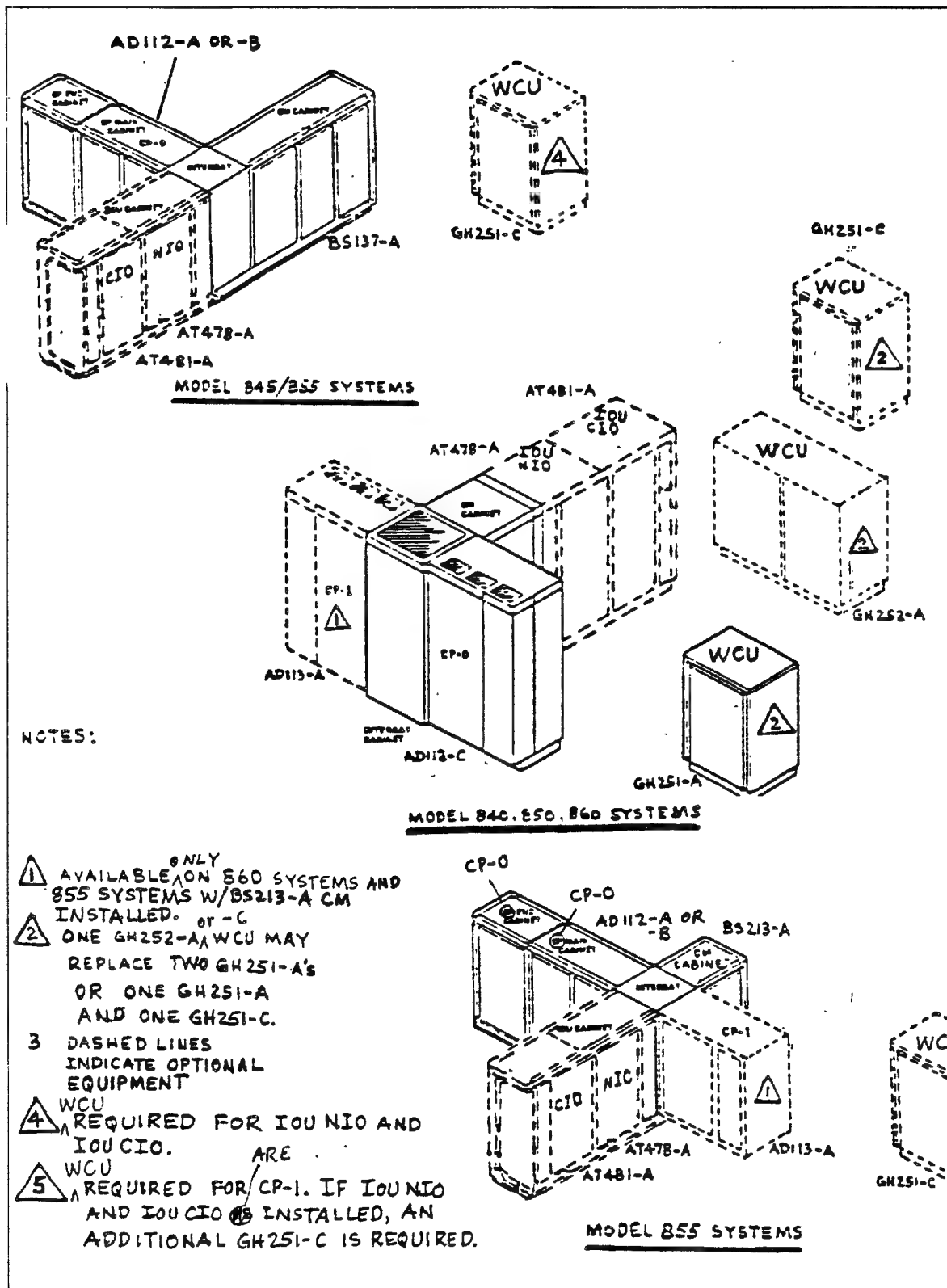


Figure 1-1. Typical Computer Systems With Options

Manual Contents

Contents of the chapters of this manual are as follows:

Chapter 1 - Introduction

- An explanation of the contents of all sections in this manual
- A typical sequence of events
- Some general installation functions/procedures that apply to all installation sections in this manual

Chapter 2 - AT478-A and AT481-A Primary and Secondary Input/Output Unit Installation

- Removal of existing IOU (AB115-A)
- Installation of new IOU (AT478-A NIO and AT481-A CIO)
- Installation of secondary IOU (AT478-A NIO and AT481-A CIO)

Chapter 3 - AD113-A Central Processor Installation

- Preinstallation of hoses
- Installation of additional central processor (CP-1).

Chapter 4 - GH251-A Water Cooling Unit Removal

Chapter 5 - GH251-C Water Cooling Unit Installation

- Preinstallation of hoses and plumbing fixtures
- Installation of WCU and preparation for its use

Chapter 6 - GH252-A/-C Water Cooling Unit Installation

- Preinstallation of hoses and plumbing fixtures
- Installation of WCU and preparation for its use

Chapter 7 - Channel Options Installation

- Installation of 170 Direct Memory Access (DMA) channel
- Installation of Intelligent Peripheral Interface (IPI)
- Installation of Intelligent Standard Interface (ISI)

Chapter 8 - Checkout

- Installation of CYBER Installation Package (CIP)
- Verify Diagnostics
- Check Warning Systems
- Run Network Operating Systems (NOS) Validation Suite
- Check Electromagnetic Compatibility

Typical Sequence of Events

Before the optional equipment arrives at the site, the installers and the EIC should become familiar with the installation processes detailed in the various sections of this manual. The EIC should determine prior to the actual installation day, those procedures he wishes to complete in a parallel mode. For example, the installation of a water cooling unit may take place simultaneously with the addition of a central processor or IOU. For this reason, the following sequence of events performed during an installation process is only typical, and may be altered.

- Check Bill of Lading
- Uncrate, Check for Damage and Verify Shipping Lists
- Remove Power From Computer System
- Remove Power From Central Processor(s), IOU, CM and WCU
- Turn off Water to IOU, Remove EMC Clips, Bolts and End and Side Panels
- Disconnect Clock Cables, Data Cables, Channel Cables and RTA Cables
- Disconnect Power Wiring From IOU and Disconnect SPCP or SPM Cables
- Disconnect Water Hoses From IOU, Remove IOU From System
- Place and Bolt Cabinets: IOU (NIO & CIO), CP-1 and WCU
- Removal of Existing WCU
- Install replacement WCU(s)
- Connect Power to Replacement WCU
- Connect Supply and Return Water Hoses and Plumbing Fixtures to WCU, IOU and CP-1
- Check Cabinet Initial Conditions
- Connect Clock Cables, Data Cables, Channel Cables, and RTA Cables

- Apply System Power and Adjust Voltages in New Equipment
- Recheck Water Flow Rates
- Install CIP and Verify Diagnostics
- Check Warning Systems and Electromagnetic Compatibility
- Run NOS Validation Suite
- Check Local and Remote Technical Assistance Functions

Unpack and Inspect Preinstallation Equipment

When the preinstallation equipment arrives at the site:

- 1. Open preinstallation shipping container(s) and inspect equipment for damage.
Report any damage immediately to shipping carrier and to Control Data.
- 2. Compare items in container to shipping document taped to outside of container.
Report any missing items immediately to Control Data.

Check Bill of Lading

The optional equipment is shipped to the site in individual containers, each marked with its own container number. These container numbers normally appear on a bill of lading which arrives with the equipment and in the possession of the carrier. Verification of the equipment to the actual bill of lading is necessary immediately upon the delivery of the equipment to the site.

Procedure

- 1. Obtain bill of lading and shipping documents from carrier immediately upon arrival of carrier at site.
- 2. Verify shipped containers against those recorded on bill of lading.
- 3. Sign receipt of shipment only after entire shipment is accounted for and inspected for damage.

Uncrate, Check for Damage, and Verify Shipping Lists

Use this procedure to remove the optional equipment cabinets from their containers. Check each shipping container and unit for any damage and verify the presence of all parts by comparing them to the shipping lists that arrive with the cabinets.

Tools/parts required

- Diagonal cutter or knife

Procedure

1. Remove shipping lists and read any special uncrating instructions attached to outer surfaces of shipping containers.

WARNING

When cut, a fastener on a cable tie may snap and fly through the air to cause personal injury. To prevent this, place one finger against the fastener to keep it from snapping when cut.

2. Compare number and type of shipping containers with shipping list. Report any missing container promptly to carrier and Control Data.
3. Open and remove shipping containers. Use plastic shipping cover from one unit for refuse container for scrap shipping materials.
4. Inspect units for damage.
5. Compare contents of containers with shipping lists and report any missing parts or damage promptly to carrier and Control Data.
6. Acknowledge complete shipment by signing carrier's bill of lading.

Special Tools Required

In addition to the two 24-in pipe wrenches shipped with the preinstallation equipment kit (P/N 67184782), you will need the following special tools to install the preinstallation equipment:

- Teflon tape
- Aerosol Coolant (P/N 12210068 or equivalent)
- Multimeter (John Fluke Model 8020A, P/N 12263279 or equivalent)
- Hot air blower heat gun with narrow insulated nozzle (P/N 12262503 or equivalent)

Table 1-1 lists special tools (other than preinstallation equipment) that you will need to order from Control Data and locally purchase for the installation. Make sure that all of these tools are available at the site before any of the optional equipment arrives.

Proper use of these tools usually results in an efficient installation. However, if an unusual problem arises during any procedure, additional maintenance tools are available. To order them, refer to the ORMIC list provided by Engineering Services.

Table 1-1. Special Tools and Materials Ordered From Control Data

X	Quantity	Description	Use	Notes
Control Data Order				
()	1	Modem, P/N	Refer to RTA Handbook	
()	1	Modem cable, P/N 62032106	Connecting modem to IOU	
()	1	Aerosol coolant, P/N 12210068	Warning system checks	
()	1	CAMS 11 Miftape, P/N 12322211	EMC grounding checks	
()	1	Cobratec solution, P/N 22824498	Anti-corrosion solution for water cooling unit	
()	2	Cam-action rollers (portable), P/N TD-00218742	Positioning central computer cabinets	
()	2	Heavy gauge steel plates	Use with cam-action rollers	
()	1	Differential pressure gauge, P/N 53812062	Measuring site flow rate	
()	1	Drain hose, P/N 17608600	Bleeding air from CP supply and return water lines	
()	1	Drift Punch	Aligning central computer bolt holes	
()	1	Funnel, P/N 12263461	Filling the water tank	
()	1	Hot air blower heat gun with narrow insulated nozzle, P/N 12262503	Warning system checks	
()	1	Local terminal (CC555 or equivalent)	Local RTA check	

1. If site is in country where CCITT is telecommunications standard, purchase a CCITT acoustic coupler (this equipment not a requirement) that meets the requirements specified in RTA Handbook (see Related Manuals on the About This Manual page).

(Continued)

Table 1-1. Special Tools and Materials Ordered From Control Data (Continued)

X	Quantity	Description	Use	Notes
Control Data Order				
()	1	Local terminal cable, P/N 19266318	Local RTA check	
()	1	Microfiche listing of microcode	Microcode description	
()	1	NOS System Validation Suite, P/N 77987603A	Running final confidence tests	
		or		
	1	NOS/VE System Validation Suite (as applicable), P/N 77987637A		
()	1	Safety glasses, P/N 51730100	Protection from Cobratec solution	
()	1	Temperature probe (Model 80T-150F), P/N 12263445	Measuring site chilled water temperature	
()	1	Voltmeter (John Fluke Model 8020A or equivalent), P/N 12263279	Voltage checks	
Local Purchase				
()	1	Gloves (rubber or plastic	Protection from Cobratec solution	
()	1	Screwdriver (phillips, thin, long, magnetic, and insulated)	CM/IOU Warning System Checks	
()	1	Water container, 19.0 L (5 gal)	Bleeding air from CP supply/return water lines	
()	1	Wrench (5/16-in refriger.)	CM/IOU freon valves	
()	1	Wrench (1/4-in refriger.)	CM/IOU freon valves	

AT478-A and AT481-A Primary and Secondary Input/Output Unit Installation 2

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AT478-A and AT481-A Primary and Secondary Input/Output Unit Installation 2

This chapter contains procedures for removing the existing AB115-A IOU and installing the optional AT478-A IOU NIO and AT481-A IOU CIO cabinets in its place in any of the CYBER 180 Model 845/855 or 840/850/860 Computer Systems. It also contains procedures for installing the secondary IOU. A typical sequence of events is as follows:

- **Remove Power From Computer System**
 - Remove Power From BS213-A CM
 - Remove Power From CP-0
 - Remove Power From CP-1
 - Remove Power From AB115-A IOU
 - Remove Power From BS137-A CM
 - Remove Power From GH251-A Water Cooling Unit
 - Remove Site Power From Computer System
- **Disconnect AB115-A IOU From Central Processor**
 - Remove IOU Water Supply
 - Close Valves in Condensing Unit
 - Drain Site Water and Remove Hoses From Condensing Unit
 - Remove IOU EMC Clips, Bolts, and End and Side Panels (845/855)
 - Remove IOU EMC Clips, Bolts, and End and Side Panels (840-860)
 - Remove IOU EMC Clips, Bolts, and End and Side Panels (Dual-CPs)
 - Disconnect IOU Clock Cables
 - Disconnect IOU/CP-0 Data Cables
 - Disconnect Radial Interface Cable (J70) From IOU Backpanel
 - Disconnect IOU Channel Cables
 - Disconnect Local/Remote Technical Assistance Cables
 - Disconnect IOU Power Wires
 - Disconnect Status and Control Cables
 - Remove IOU From Computer System
- **Install AT478-A/AT481-A Primary IOU Cabinet**
 - Preinstallation Procedures for IOU Cabinets
 - Install IOU Cabinet (NIO/CIO) on an 845/855 Single-CP System
 - Install IOU Cabinet (NIO/CIO) on an 855 Dual-CP System
 - Install IOU Cabinet (NIO/CIO) on 840, 850, or 860 Systems
 - Connect IOU Water Hoses to Manifolds
 - Connect Primary IOU Cables
 - Connect Channel Cables to IOU NIO
 - Connect CP-0 Data Cables to IOU NIO Backpanel A
 - Connect Clock Cables
 - Connect Fault-Sense Cables to CM Multiplexer Board
 - Connect SPCP Status and Control Cables
 - Connect SPM Status and Control Cables
- **Connect Power**
 - Check Power-Off Conditions
 - Connect Power to Primary IOU
 - Check Primary Blower Motor Voltage Connections
 - Power Plug Connections to Primary IOU
 - Connect IOU Power Cords to Interbay Power Panel

- Terminal Block Connections to Primary IOU
- Adapt the IOU
 - Verify or Change Cabinet Switches
- Apply System Power
 - Apply M-G Set Power From SPCP (845/855 Systems Only)
 - Apply M-G Set Power From SPM
 - Apply Power and Adjust Voltages for IOU NIO Cabinet
 - Apply Power and Adjust Voltages for IOU CIO Cabinet
- Check Water Flow Rates
- Install Secondary IOU
 - Preinstallation and Site Preparation
 - Unit Installation
 - Connect Power
 - Connect Secondary IOU Cables
 - Final Secondary IOU Procedures

NOTE

When installing the optional IOU NIO and IOU CIO, an additional water cooling unit (WCU) is required. The internal WCU within CP-0 cannot be used to cool the new equipment.

Remove Power From Computer System

Prior to installing any of the optional equipment, remove power from the computer system. This procedure is divided into several tasks, as follows:

- Remove Power From BS213-A CM
- Remove Power From CP-0
- Remove Power From CP-1 (if present)
- Remove Power From AB115-A IOU
- Remove Power From BS137-A CM
- Remove Power From GH251-A Water Cooling Unit
- Remove Site Power From Computer System

To present the information in this chapter in a structured format, this page has been left blank.

Remove Power From BS213-A CM

Use this procedure to remove the power from the CM cabinet. Refer to figure 2-1.

NOTE

IS CM A BS213-A?

- If yes, continue.
- If no, go to next procedure.

Procedure

1. Set mode switch on 400-Hz power distribution box to LOCAL.
2. Set MAIN DISCONNECT 2.2V, -5.2V, and +5.5V DISCONNECT circuit breakers on front of 400-Hz power distribution box to OFF.

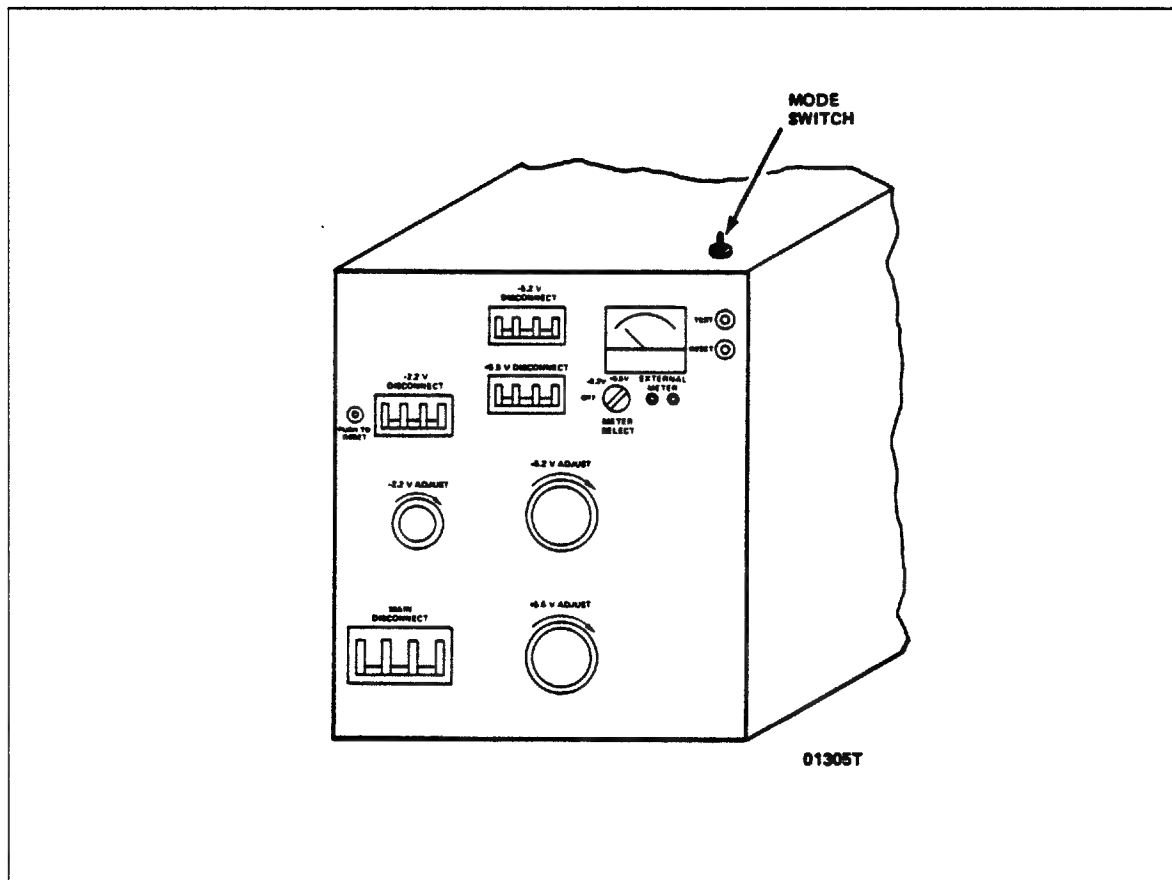


Figure 2-1. BS213-A CM 400-Hz Power Distribution Box

Remove Power From CP-0

Use this procedure to remove the power from the CP-0 cabinet. Refer to figures 2-2 and 2-3.

Procedure

- 1. Set mode switches on rear of each of four CP-0 50/60-Hz power distribution boxes to LOCAL.
- 2. Press and release STOP switch at rear of CP-0 main cabinet 50/60-Hz Power Distribution Box to remove 400-Hz power.
- 3. Set INPUT POWER DISCONNECT circuit breaker on CP-0 end cabinet power distribution box to OFF to remove 50/60-Hz power.
- 4. Set MAIN 400 Hz DISCONNECT circuit breaker on front of CP-0 main cabinet 400 Hz power distribution boxes to OFF.

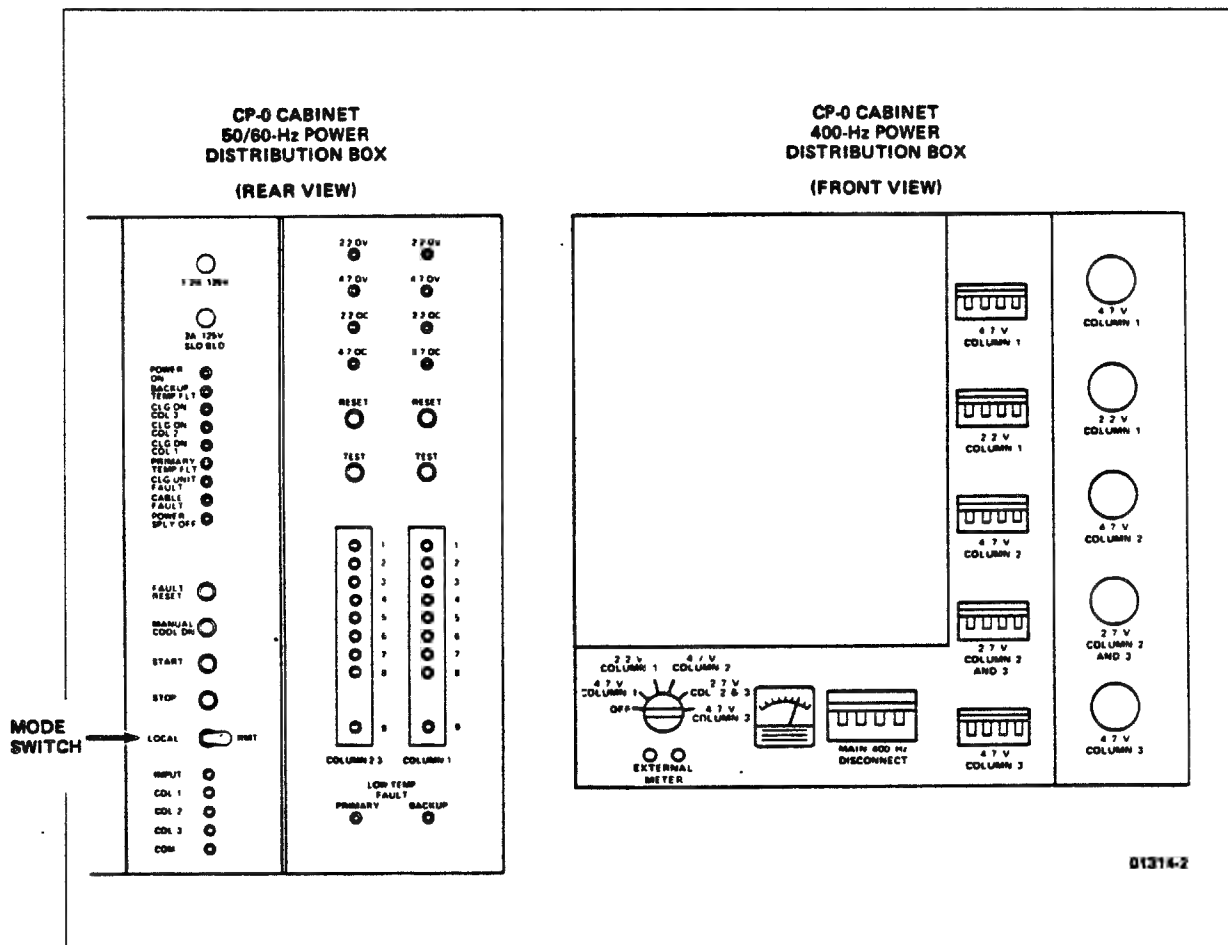


Figure 2-2. CP-0 Main Cabinet 50/60- and 400-Hz Power Distribution Boxes

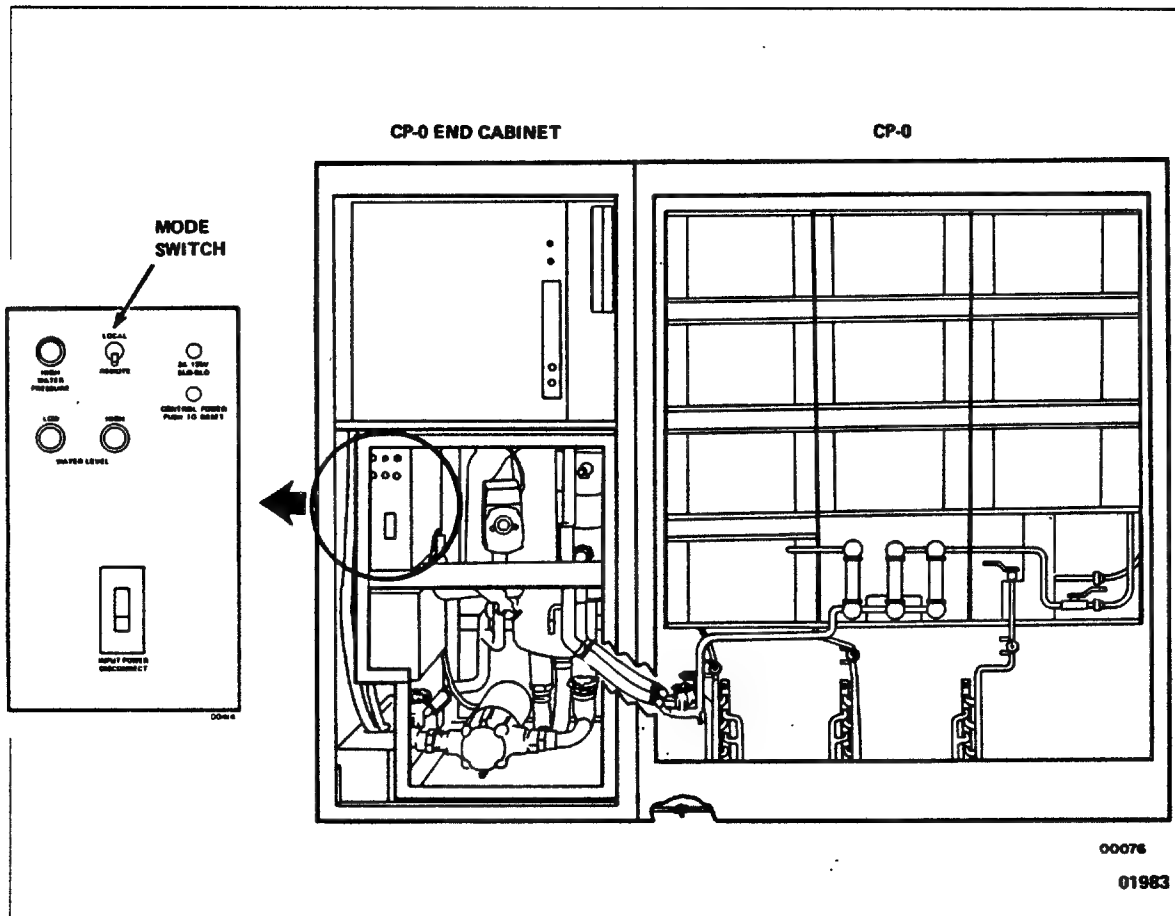


Figure 2-3. CP-0 End Cabinet 50/60-Hz Power Distribution Box .

Remove Power From CP-1

Use this procedure to remove the power from the IOU cabinet. Refer to Figure 2-4.

NOTE

IS CP-1 PRESENT?

- *If yes, continue.*
- *If no, go to next procedure.*

Procedure

1. Set mode switches on CP-1 power distribution boxes to LOCAL.
2. Set 400-Hz DISCONNECT, 2.2V DISCONNECT, and 4.7V DISCONNECT circuit breakers on front of power distribution box to OFF.
3. Repeat step 2 for the remaining two columns of CP-1.

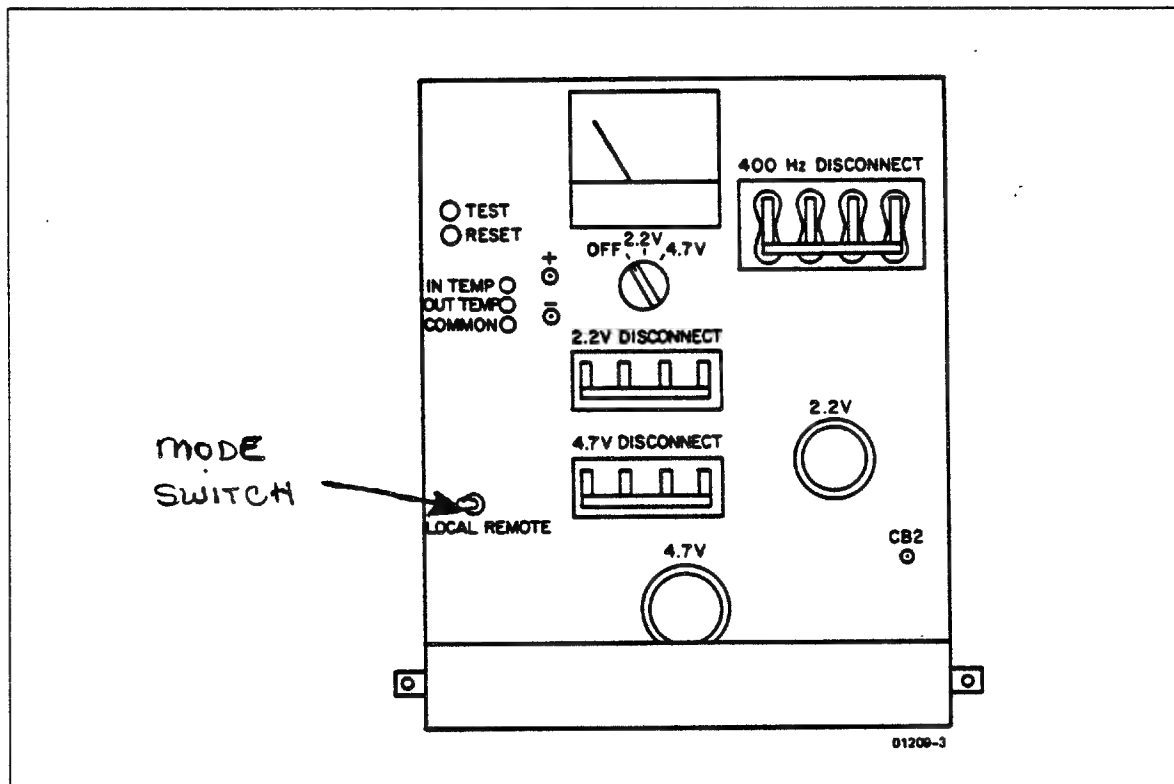


Figure 2-4. CP-1 400-Hz Power Distribution Box

Remove Power From AB115-A IOU

Use this procedure to remove the power from the IOU cabinet. Refer to figure 2-5.

Procedure

- 1. Set CONTROL (mode) switch on 50/60-Hz power distribution box to LOCAL.
- 2. Press and release POWER OFF switch at rear of 50/60-Hz power distribution box to remove 400-Hz power.
- 3. Allow about 15 minutes of compressor pump down time for pressure release of IOU condenser.

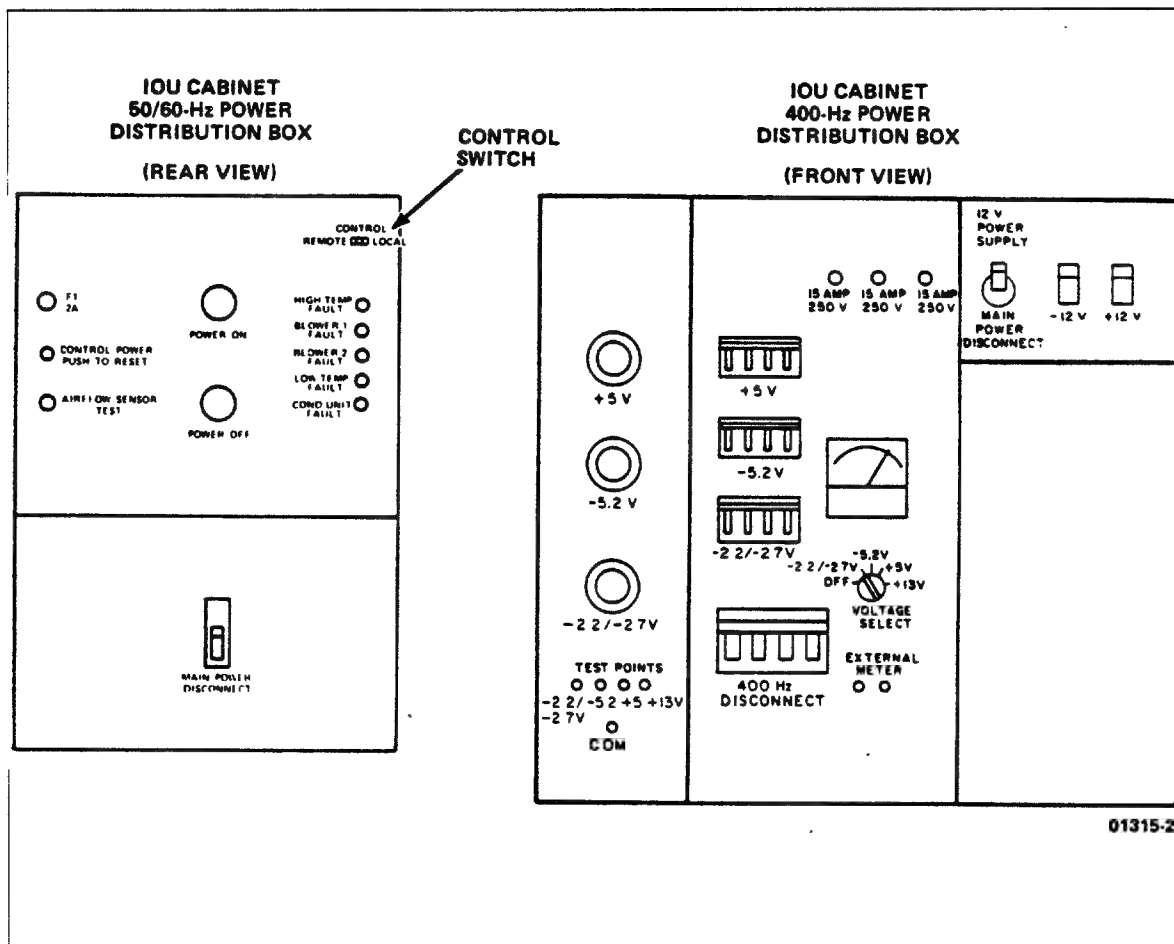


Figure 2-5. AB115-A IOU and 400-Hz Power Distribution Boxes

- 4. Set MAIN POWER DISCONNECT circuit breaker at rear of 50/60-Hz power distribution box to OFF to remove 50/60-Hz power.
- 5. Set 400 Hz DISCONNECT circuit breaker on front of 400-Hz power distribution box to OFF.

Remove Power From BS137-A CM

Use this procedure to remove the power from the CM cabinet. Refer to figure 2-6.

NOTE

IS CM A BS137-A?

- If yes, continue.
- If no, go to next procedure.

Procedure

- 1. Set CONTROL (mode) switch on 50/60-Hz power distribution box to LOCAL.
- 2. Press and release POWER OFF switch at rear of 50/60-Hz power distribution box to remove 400-Hz power.
- 3. Set CLOCK SUPPLY DISCONNECT switch on 400-Hz power distribution box to OFF (down).

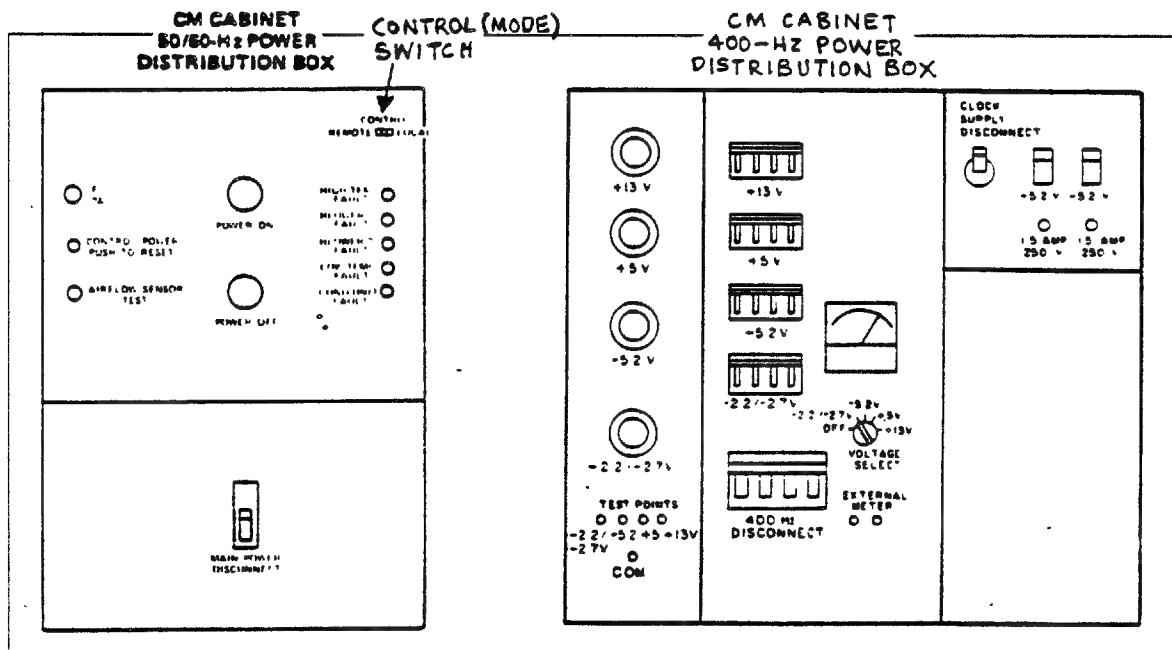


Figure 2-6. BS137-A CM 50/60- and 400-Hz Power Distribution Boxes

- 4. Set MAIN POWER DISCONNECT circuit breaker at rear of 50/60-Hz power distribution box to OFF.
- 5. Set 400 Hz DISCONNECT circuit breaker on front of 400-Hz power distribution box to OFF.

Remove Power From GH251-A Water Cooling Unit

Use this procedure to remove 50/60 Hz power from the GH251-A WCU. Refer to figure 2-7.

NOTE

IS GH251-A PRESENT?

- *If yes, continue.*
- *If no, go to next procedure.*

Procedure

1. Set mode switch to LOCAL.
2. Set INPUT POWER DISCONNECT circuit breaker on WCU control panel to OFF.

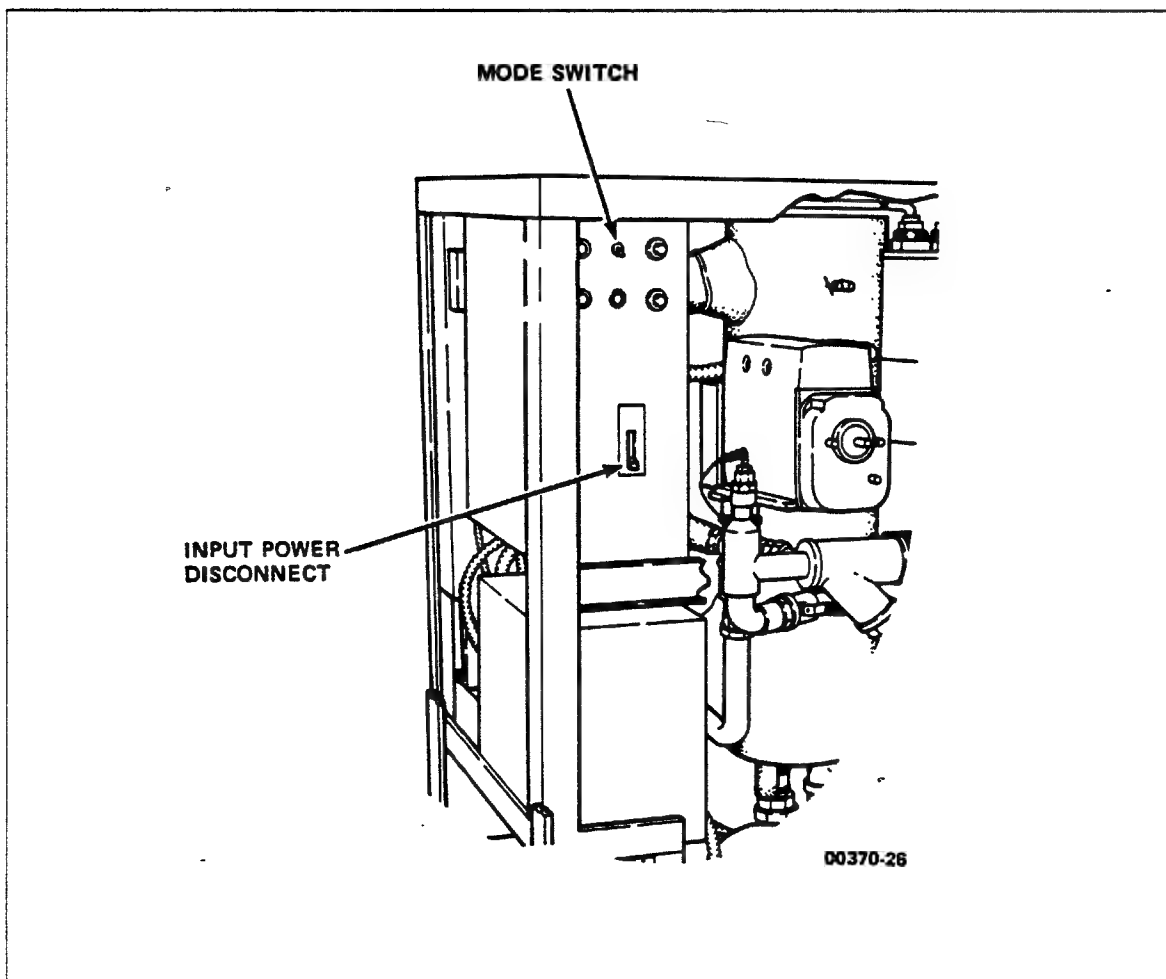


Figure 2-7. GH251-A WCU Control Panel

Remove Site Power From Computer System

Use this procedure to remove site 50/60- and 400-Hz power from the computer system. Refer to figure 2-8.

Procedure prerequisites

- 50/60-Hz cabinet power is off
- 400-Hz cabinet power is off

Procedure

- ___ 1. Locate 400-Hz wall-mounted circuit breaker panel for computer system.
- ___ 2. Set 400-Hz wall-mounted circuit breaker(s) to OFF.
- ___ 3. Locate 50/60-Hz wall-mounted circuit breaker panel.
- ___ 4. Set 50/60-Hz wall-mounted circuit breaker(s) to OFF.
- ___ 5. Remove cover from power input box on each cabinet.
- ___ 6. Using the multimeter, check terminals TB1 and TB2 in each cabinet for no voltage to ensure that power is off. This step ensures that the correct site (wall-mounted) circuit breakers have been turned off. Terminal connections are as follows:
 - a. 50/60-Hz Wall-Mounted Circuit Breaker

___ 1) CP-0	TB2
___ 2) CP-1	(no terminal)
___ 3) BS137-A	TB1
___ 4) BS213-A	TB1
___ 5) IOU	TB1
 - b. 400-Hz Wall-Mounted Circuit Breaker

___ 1) CP-0	TB1
___ 2) CP-1	TB1 (each column)
___ 3) BS137-A	TB2
___ 4) BS213-A	TB2
___ 5) IOU	TB2

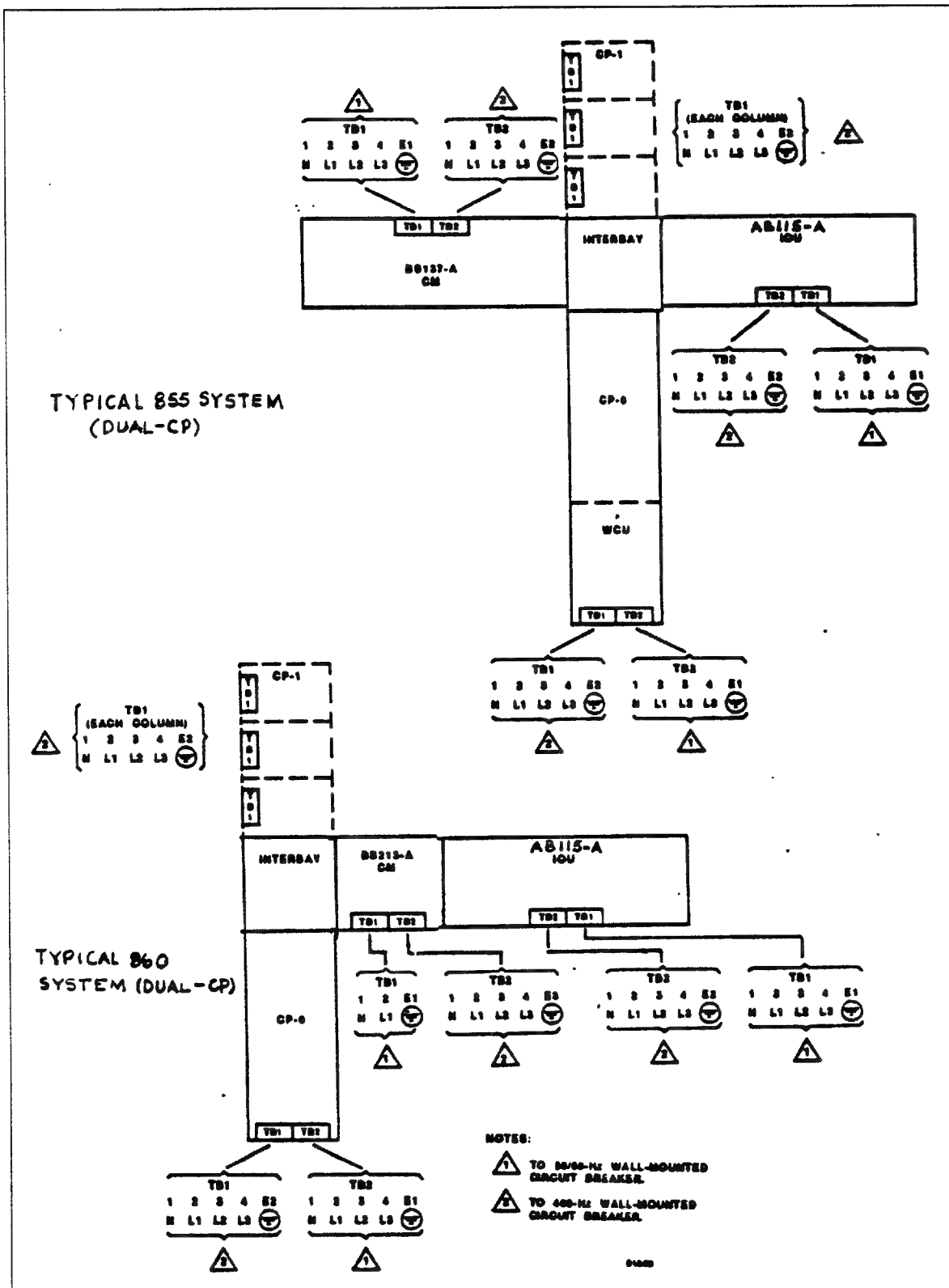


Figure 2-8. Typical Power Distribution Diagrams

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Disconnect AB115-A IOU From Central Processor

Disconnecting the AB115-A IOU from the CP prior to installing a replacement IOU involves several tasks. They are as follows:

- Remove IOU Water Supply
- Close Valves in Condensing Unit
- Drain Site Water and Remove Hoses From Condensing Unit
- Remove IOU EMC Clips, Bolts, and End and Side Panels (845/855)
- Remove IOU EMC Clips, Bolts, and End and Side Panels (840-860)
- Remove IOU EMC Clips, Bolts, and End and Side Panels (Dual-CPs)
- Disconnect IOU Clock Cables
- Disconnect IOU/CP-0 Data Cables
- Disconnect Radial Interface Cable (J70) From IOU Backpanel
- Disconnect IOU Channel Cables
- Disconnect Local/Remote Technical Assistance Cables
- Disconnect IOU Power Wires
- Disconnect Status and Control Cables
- Remove IOU From Computer System

Remove IOU Water Supply

Use this procedure to shut off the water to the IOU cabinet. Refer to figure 2-9.

Procedure prerequisites

- 50/60- and 400-Hz power is off

Procedure

- 1. Locate site water supply and return shut-off valves that furnish water to IOU condensing unit.
- 2. Shut off water by closing site water supply and return shut-off valves.

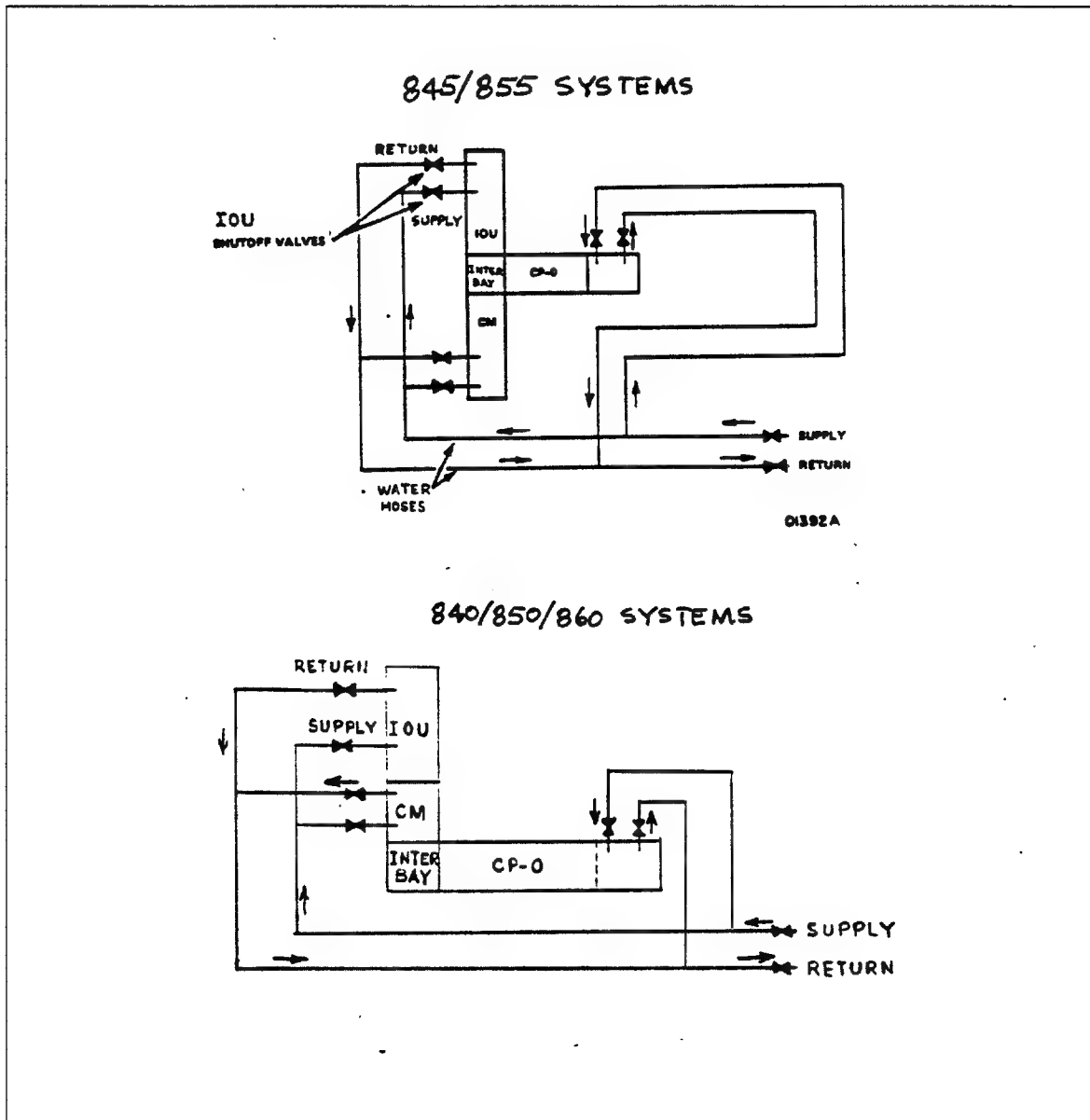


Figure 2-9. Typical Closed-Loop Water System

Close Valves in Condensing Unit

Use this procedure to close three valves in the IOU condensing unit in preparation for removal from the system. Refer to figures 2-10 and 2-11.

Prerequisites

- 50/60- and 400-Hz power is off

Tools/parts required

- 1/4-in wrench (for chassis suction service and condenser discharge service valves)
- 5/16-in wrench (for condenser liquid service and chassis liquid service valves)
- Red warning tags

CAUTION

After 400-Hz power has been removed, the condensing unit pumps down within 3 to 5 minutes. Do not close valves until condensing unit has pumped down.

Procedure

- 1. Remove protective cover from rear of condensing unit.
- 2. Remove cap from liquid service valve.
- 3. Close condenser liquid service valve fully clockwise using 1/4-in wrench.
- 4. Remove cap from condenser discharge service valve.
- 5. Close condenser discharge service valve fully clockwise using 5/16-in wrench.
- 6. Replace both caps on service valves.
- 7. Remove both top and bottom protective covers from front of condensing unit.
- 8. Remove cap from compressor suction service valve.
- 9. Close compressor suction service valve fully clockwise using 5/16-in wrench.
- 10. Replace cap on compressor suction service valve.
- 11. Attach a red warning tag to each valve to indicate that it has been closed.
- 12. Tighten front transportation tie down bolt.
- 13. Replace front protective top and bottom covers on condensing unit(s). Rear protective cover is replaced later.

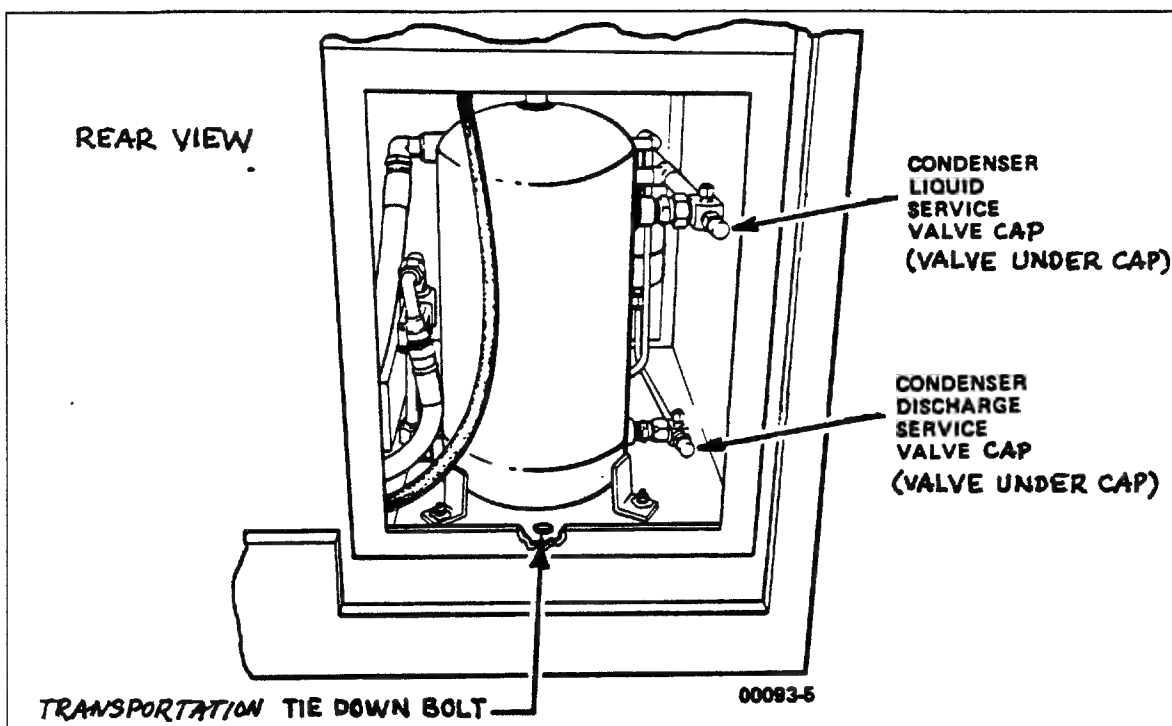


Figure 2-10. Locations of IOU Condenser Service Valves

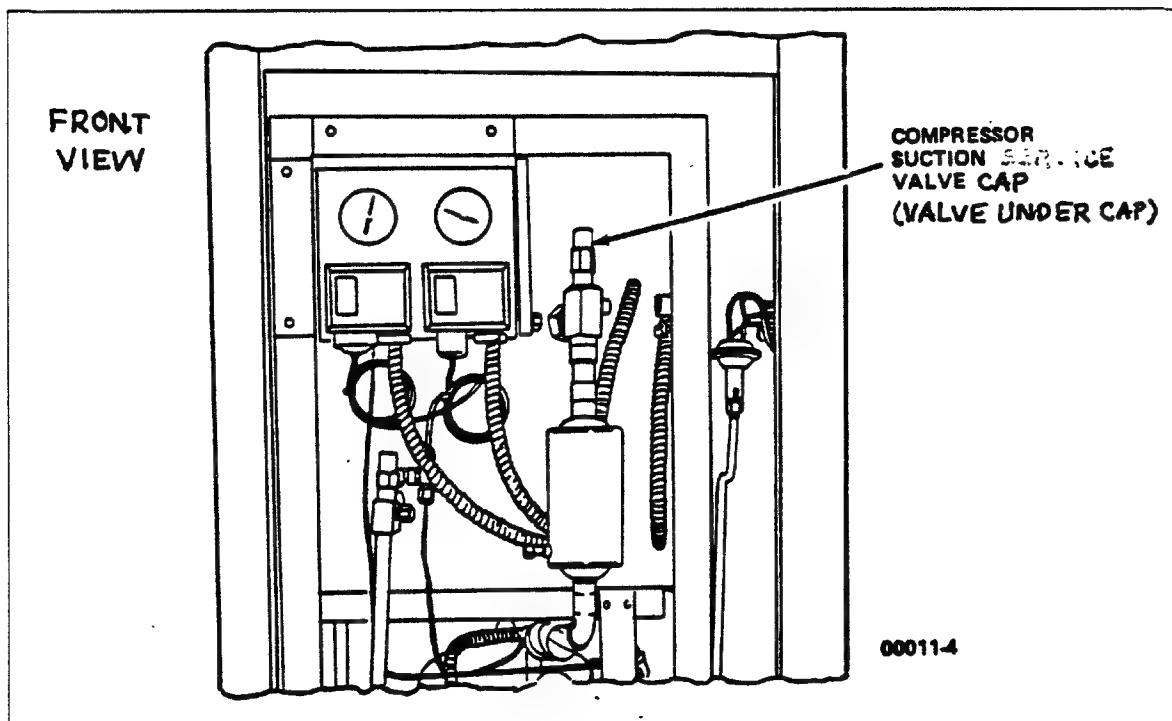


Figure 2-11. Location of IOU Suction Service Valve Stem

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Drain Site Water and Remove Hoses From Condensing Unit

Use this procedure to remove site water and hoses from the IOU condensing unit in preparation for removal from the system. Refer to figure 2-12.

Prerequisites

- 50/60- and 400-Hz power is removed
- Site water supply and return valves are closed at source.

Tools/parts required

- Container 7.6 L (2 gal)
- Slotted screwdriver
- Air compressor, optional
- Wet-dry vacuum cleaner, optional

Procedure

Perform the following steps on the IOU condensing unit.

- ___ 1. Disconnect site supply water hose at source.

NOTE

Use a container or wet-dry vacuum during the procedure performed in the next few steps.

- ___ 2. Drain water from hose into container, or remove water with wet-dry vacuum cleaner.
- ___ 3. Disconnect site return water hose at source.
- ___ 4. Drain water from hose into container, or remove water with wet-dry vacuum cleaner.

- 5. Open water regulating valve by turning spring tension screw CW with slotted screwdriver. Note the exact number of turns made CW so that screw can be returned to original position after next four steps have been completed.
- 6. Record number of turns made in step 6.
- 7. Place container beneath Supply Water Connection in cabinet.
- 8. Disconnect supply water hose from condenser by disconnecting flare couplings and draining any water remaining in hose.

NOTE

Step 9 is optional.

CAUTION

Do not exceed 50 psi air pressure with compressor. If water and air do not pass through plumbing, the water regulating valve may still be shut. It may be necessary to pry up on the water regulator spring with a screwdriver to open regulator valve.

- 9. At return water hose source, use air compressor to force water out of condenser and associated plumbing.
- 10. Push hose down through floor.
- 11. Turn spring tension of water regulating valve to its original position (reverse of step 6).
- 12. Disconnect return water hose from condenser by disconnecting flare couplings.
- 13. Install red plastic caps on hose connections.
- 14. Disconnect hose on pressure relief valve, if connected, and pull into cabinet.
- 15. Tighten transportation tie-down bolts at front and rear of cabinet.
- 16. Install front and rear protective covers (front may already be in place).
- 17. Coil water hose and place in separate, labeled, container for shipment.

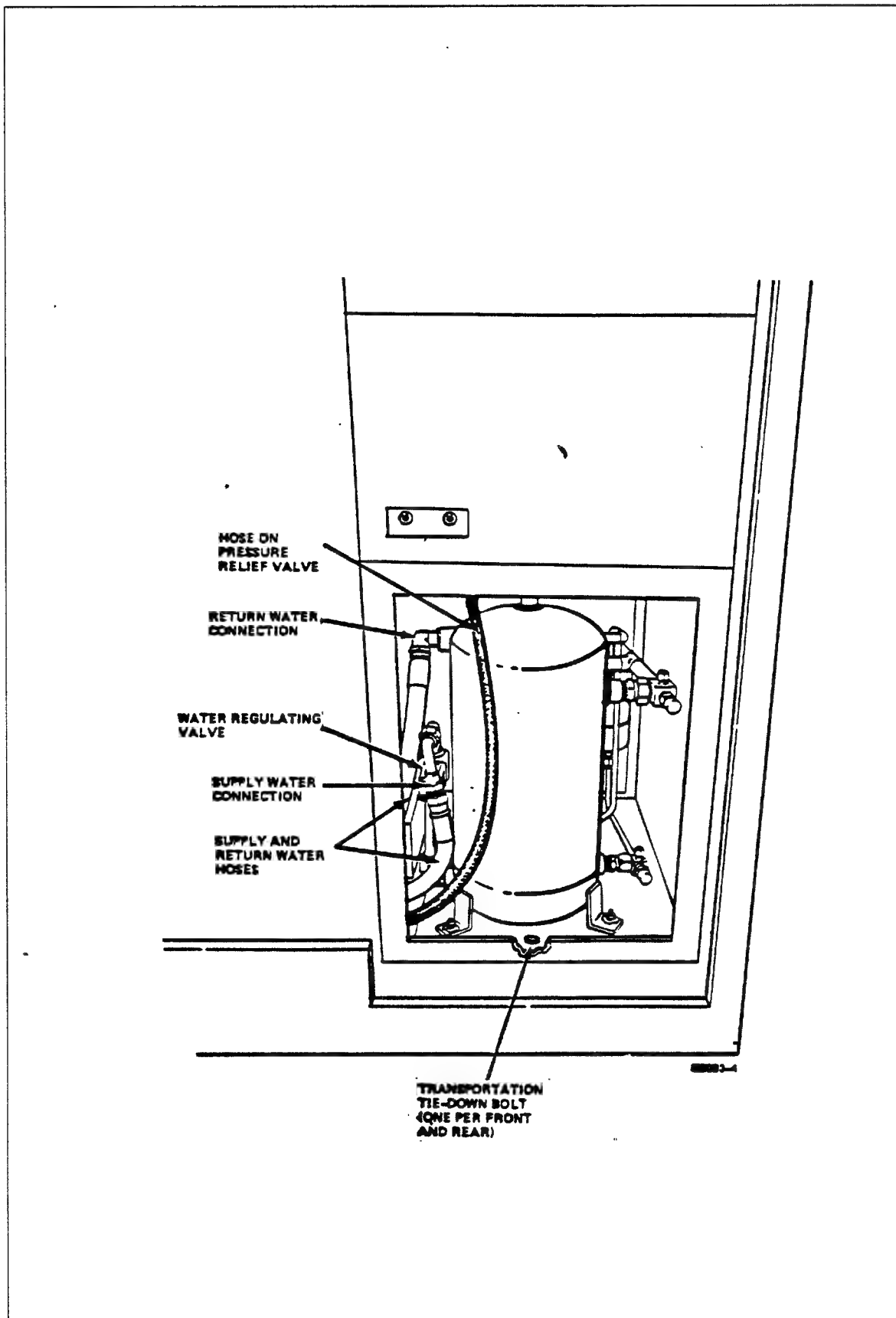


Figure 2-12. IOU Condenser Valve Locations and Water Hose Connections

Remove IOU EMC Clips, Bolts, and End and Side Panels (845/855)

Use this procedure to remove the necessary EMC clips, bolts, and end panels from the IOU cabinet in 845/855 systems. Refer to figure 2-13.

NOTE

IS SYSTEM A SINGLE-CP MODEL 845 or 855?

- *If yes, continue.*
 - *If no, go to next procedure.*
-

Procedure prerequisites

- 50/60-Hz power is off
- 400-Hz power is off

Tools/parts required

- Slotted screwdriver
- Safety glasses
- 3/8-in drive socket set

Procedure

- 1. Remove six screws which secure end panel to interbay and remove interbay end panel.
- 2. Open both IOU side panels next to interbay to provide access to bolting areas within interbay cabinet.

WARNING

Use safety glasses for eye protection while performing step 3.

- 3. Use slotted screwdriver and pliers as necessary to remove EMC clips from adjacent panels of interbay and IOU cabinets. Discard EMC clips.
- 4. Use a socket and ratchet to remove nuts and bolts from cable opening between interbay and IOU cabinets.
- 5. Use a socket and ratchet to remove nuts and bolts that secure interbay to IOU at cabinet edges.

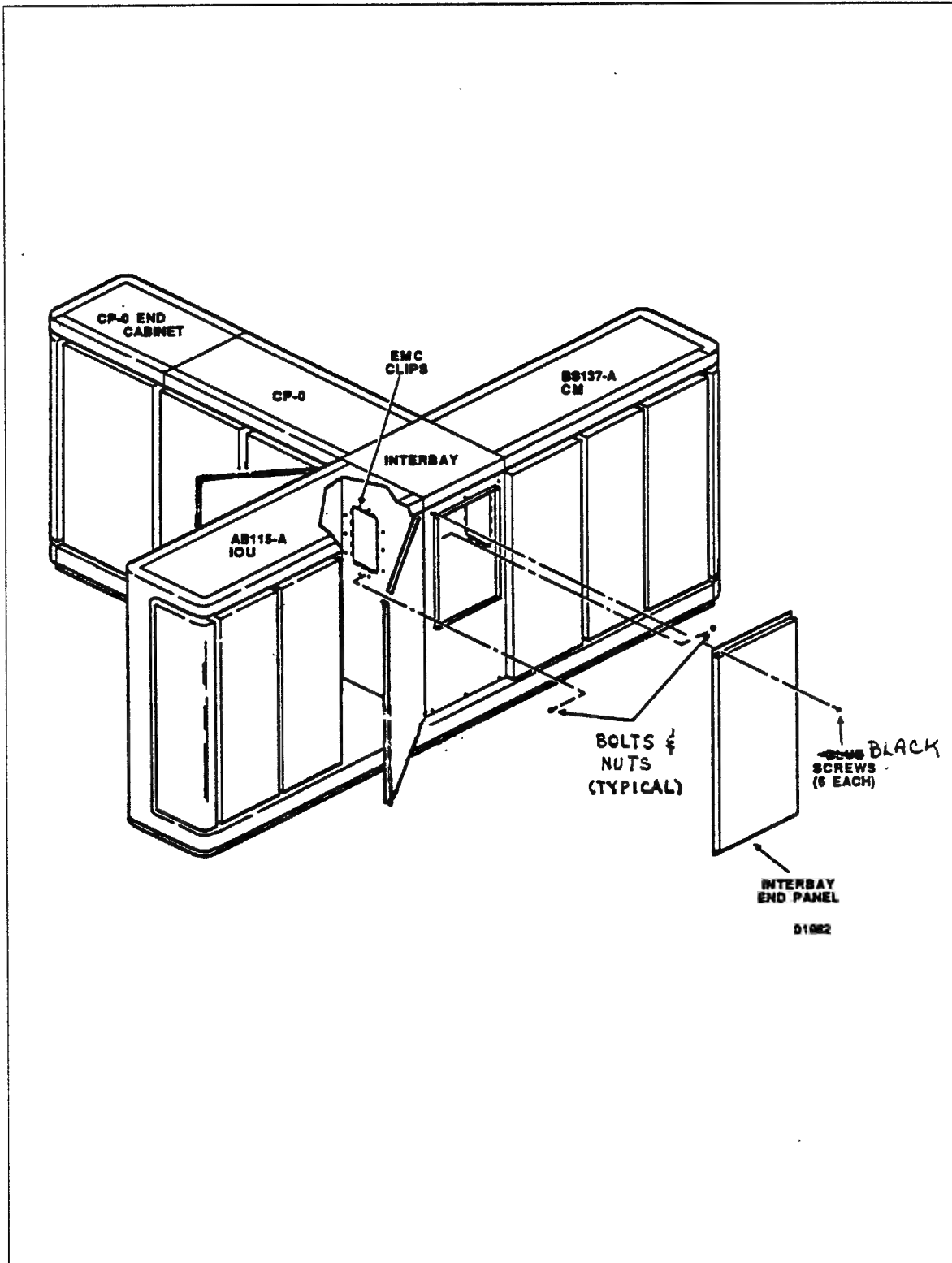


Figure 2-13. Removing IOU Hardware and Panels From 845/855 Single-CP Systems

Remove IOU EMC Clips, Bolts, and End and Side Panels (840-860)

Use this procedure to remove the necessary EMC clips, bolts, and end panels from the IOU cabinet in 840/850/860 systems. Refer to figure 2-14.

NOTE

IS SYSTEM A SINGLE-CP MODEL 840, 850, or 860?

- *If yes, continue.*
 - *If no, go to next procedure.*
-

Procedure prerequisites

- 50/60-Hz power is off
- 400-Hz power is off

Tools/parts required

- Safety glasses
- 3/8-in drive socket set

Procedure

- 1. Open both CM doors and both IOU doors to permit access to bolting hardware.

WARNING

Use safety glasses for eye protection while performing step 2.

- 2. Remove attaching hardware to remove EMC clips from adjacent panels of CM and IOU cabinets.
- 3. Remove nuts and bolts between IOU and IOU adapter.
- 4. Use Rol-a-lift to back IOU away from IOU adapter.
- 5. Remove nuts and bolts that secure IOU adapter to CM and remove IOU adapter.

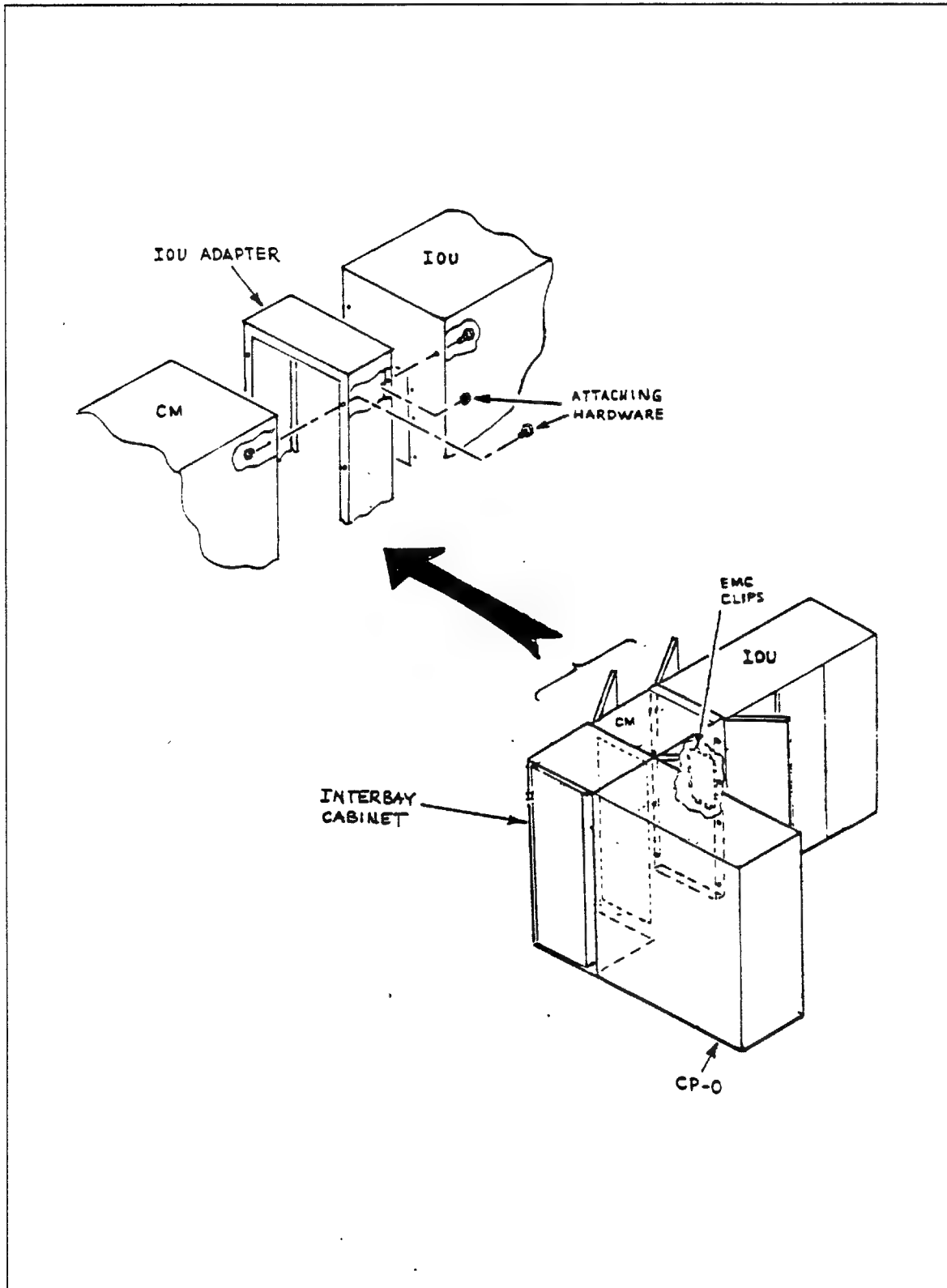


Figure 2-14. Removing IOU Hardware From 840/850/860 Single-CP Systems

Remove IOU EMC Clips, Bolts, and End and Side Panels (Dual-CPs)

Use this procedure to remove the necessary EMC clips, bolts, and end panels from the IOU cabinet which is installed in dual-CP systems. Refer to figure 2-15.

NOTE

IS SYSTEM A DUAL-CP MODEL 855?

- *If yes, continue.*
 - *If no, go to next procedure.*
-

Procedure prerequisites

- 50/60-Hz power is off
- 400-Hz power is off

Tools/parts required

- Pliers
- Slotted screwdriver
- Safety glasses
- 3/8-in drive socket set

Procedure

- 1. Open both IOU side panels adjacent to interbay.
- 2. Open both CP-1 side panels adjacent to interbay cabinet.
- 3. Open both CP-0 side panels adjacent to interbay cabinet.

WARNING

Use safety glasses for eye protection while performing step 4.

- 4. Remove EMC clips from interbay and IOU surfaces.
- 5. Remove nuts and bolts that secure IOU to interbay.

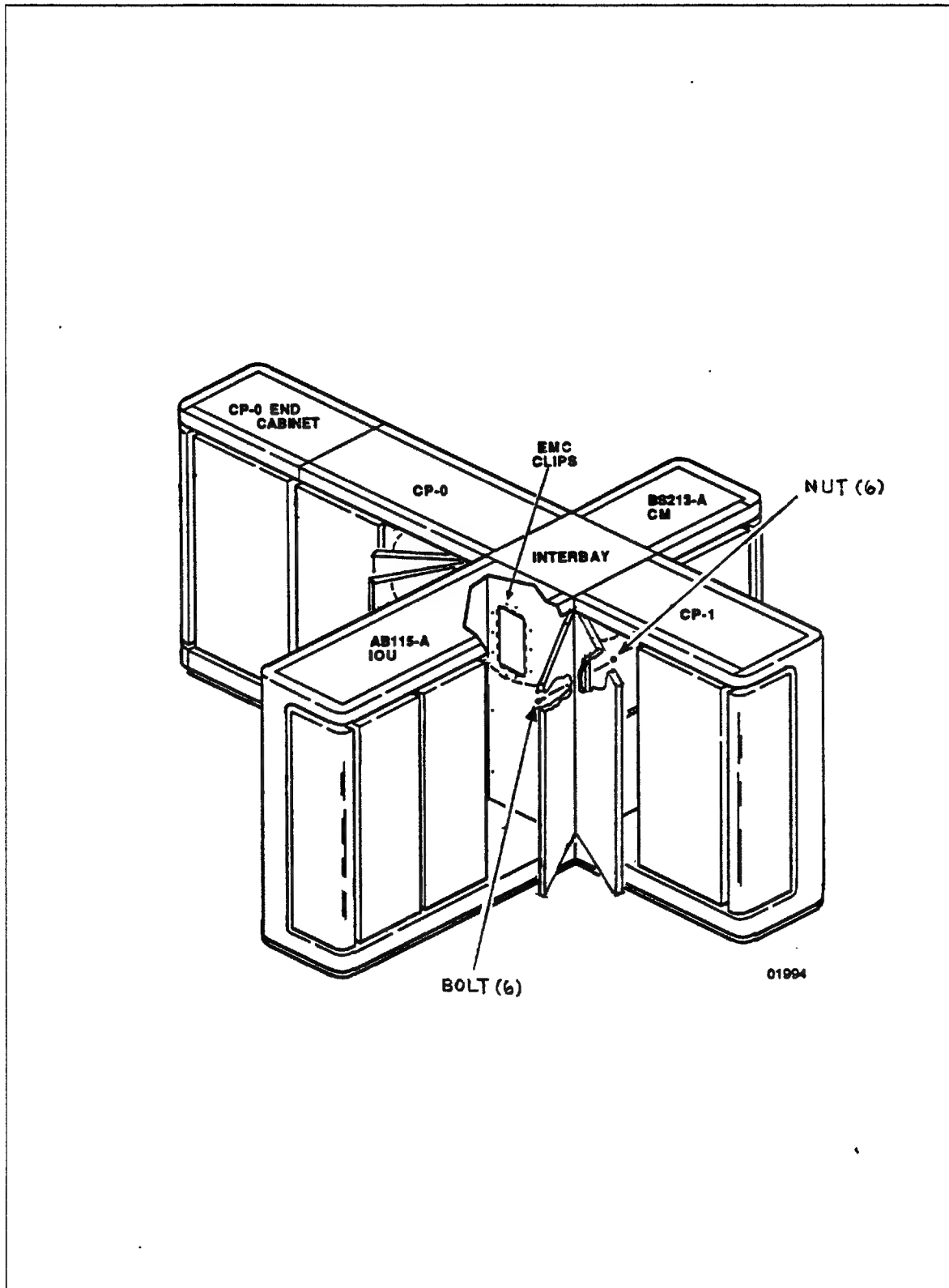


Figure 2-15. Removing IOU Hardware and Panels From Dual-CP 855 Systems

Disconnect IOU Clock Cables

Use this procedure to disconnect the clock cables from the IOU cabinet. Refer to figure 2-16.

Procedure prerequisites

- 50/60-Hz power is off
- 400-Hz power is off

Procedure

- 1. Set CLOCK SUPPLY DISCONNECT switch on clock power supply to off (down) if CM is a BS213-A; if CM is a BS137-A, set CLOCK SUPPLY DISCONNECT switch on CM cabinet 400-Hz power distribution box to OFF.
- 2. Disconnect J41 from IOU and pull into CM or interbay as appropriate. Label cable with source and destination.
- 3. Disconnect J40 from IOU and pull into CM or interbay as appropriate. Label cable with source and destination.

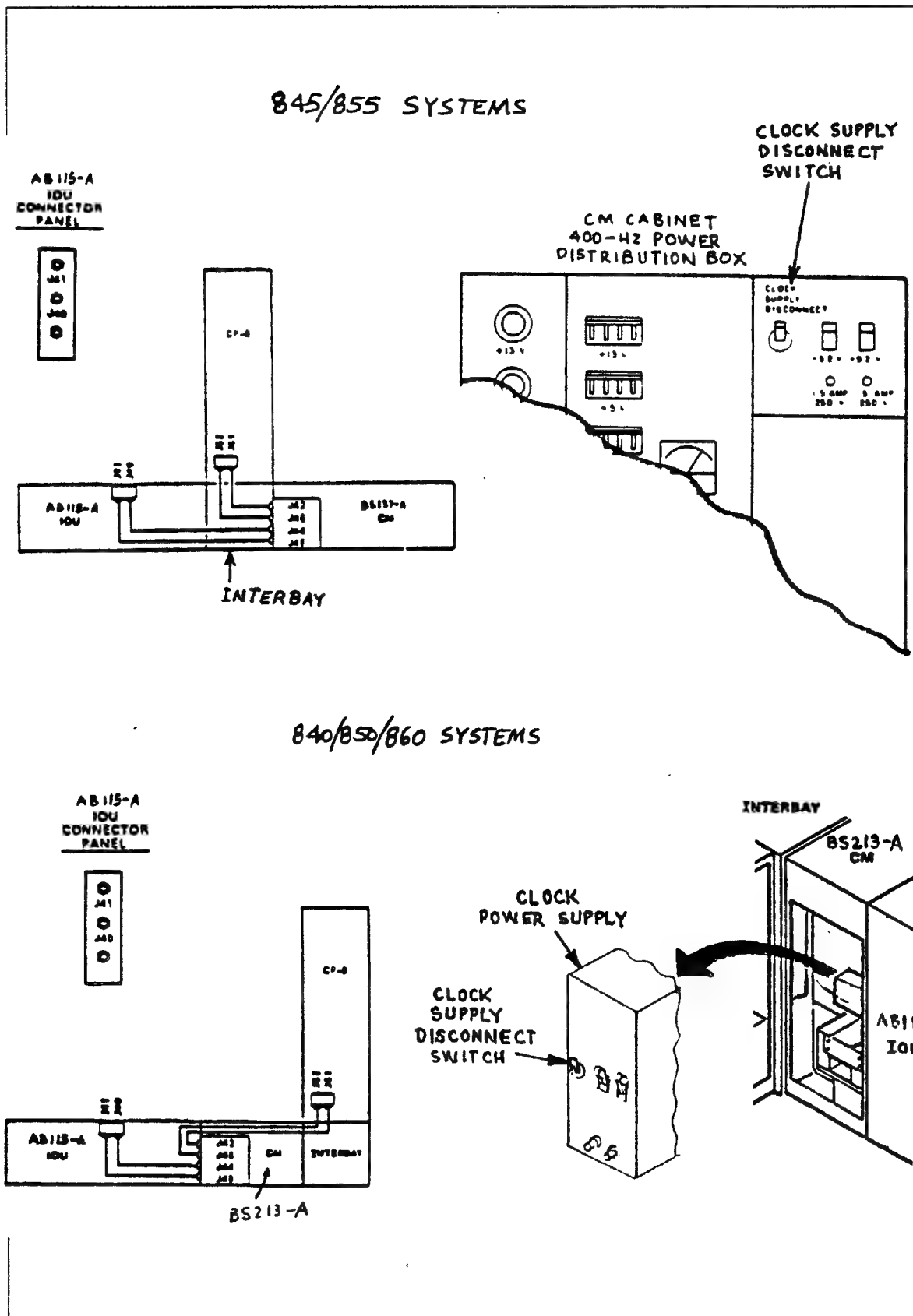


Figure 2-16. Disconnecting Clock Cables

Disconnect IOU/CP-0 Data Cables

Use this procedure to disconnect the IOU/CP-0 data cables. Refer to figure 2-17.

Procedure prerequisites

- 50/60-Hz power is off
- 400-Hz power is off

Procedure

1. Disconnect data cables (table 2-1) from IOU end. Leave cables connected to CP-0.

Table 2-1. IOU/CP-0 Data Cable Connections

CP-0 Cable Jack Pair	IOU Backpanel (top two pins)	Check (X)
J50/ J51	F23-B096/C096 F23-A096/D096	() ()
J52/ J53	F22-B096/C096 F22-A096/D096	() ()
J54/ J55	F21-B096/C096 F21-A096/D096	() ()
J56/ J57	F20-B096/C096 F20-A096/D096	() ()
J58/ J59	F18-B101/C101 F18-A101/D101	() ()
J60/ J61	F16-B097/C097 F16-A097/D097	() ()
J62/ J63	F15-B097/C097 F15-A097/D097	() ()
J64/ J65	F14-B097/C097 F14-A097/D097	() ()
J66/ J67	F13-B097/C097 F13-A097/D097	() ()

2. Pull cables into interbay cabinet.

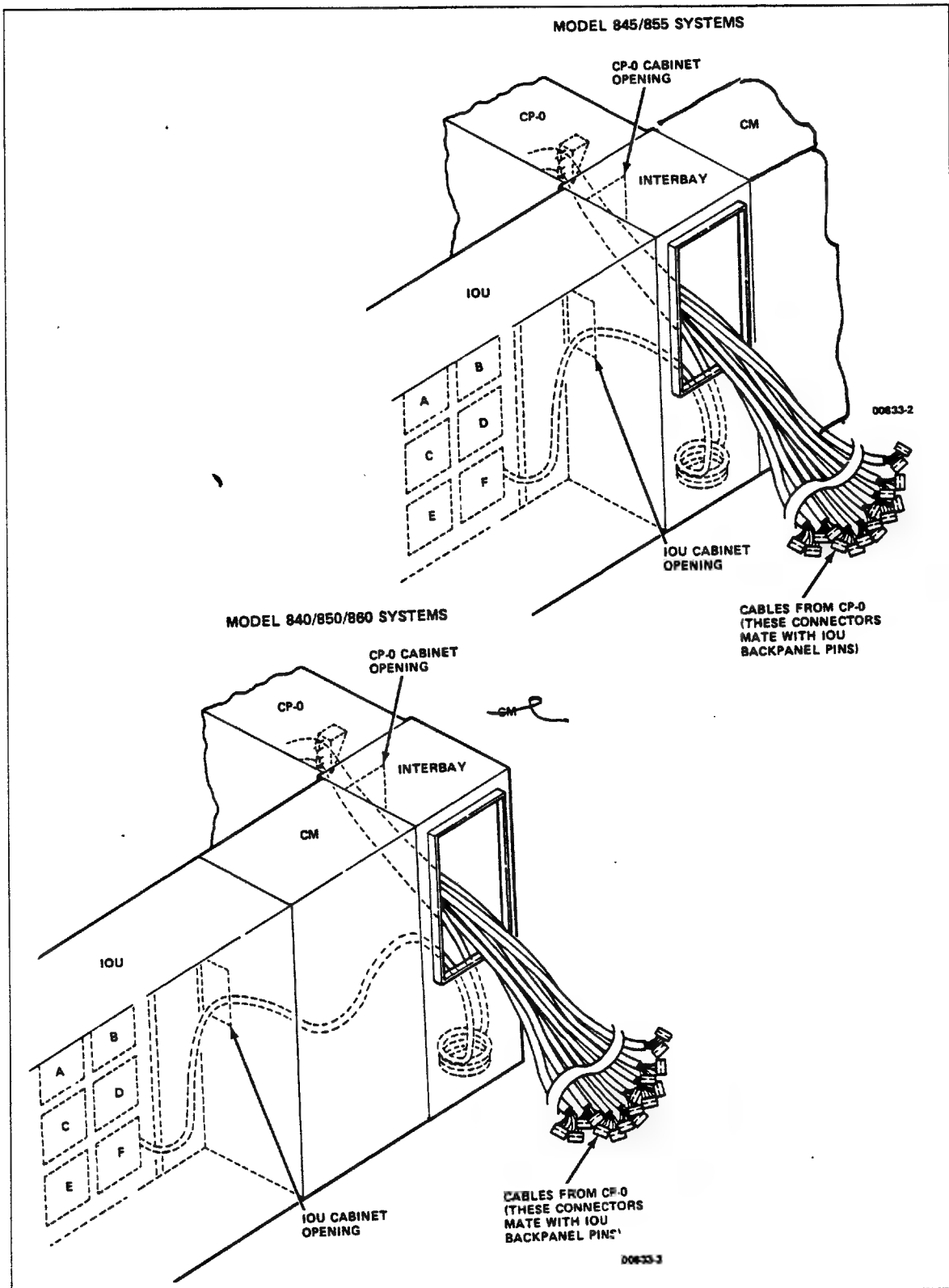


Figure 2-17. Disconnecting IOU Data Cables

Disconnect Radial Interface Cable (J70) From IOU Backpanel

Use this procedure to disconnect the radial interface cable (J70) from the IOU backpanel. Refer to figure 2-18.

Procedure prerequisites

- 50/60-Hz power is off
- 400-Hz power is off

Procedure

1. Locate and disconnect J70 cable from F03-A004/B004 on IOU backpanel. Route cable through interbay and place on interbay floor for later use.
2. If CP-1 is already installed, disconnect J70 from IOU backpanel location F04-A004/B004. Pull cable into interbay.

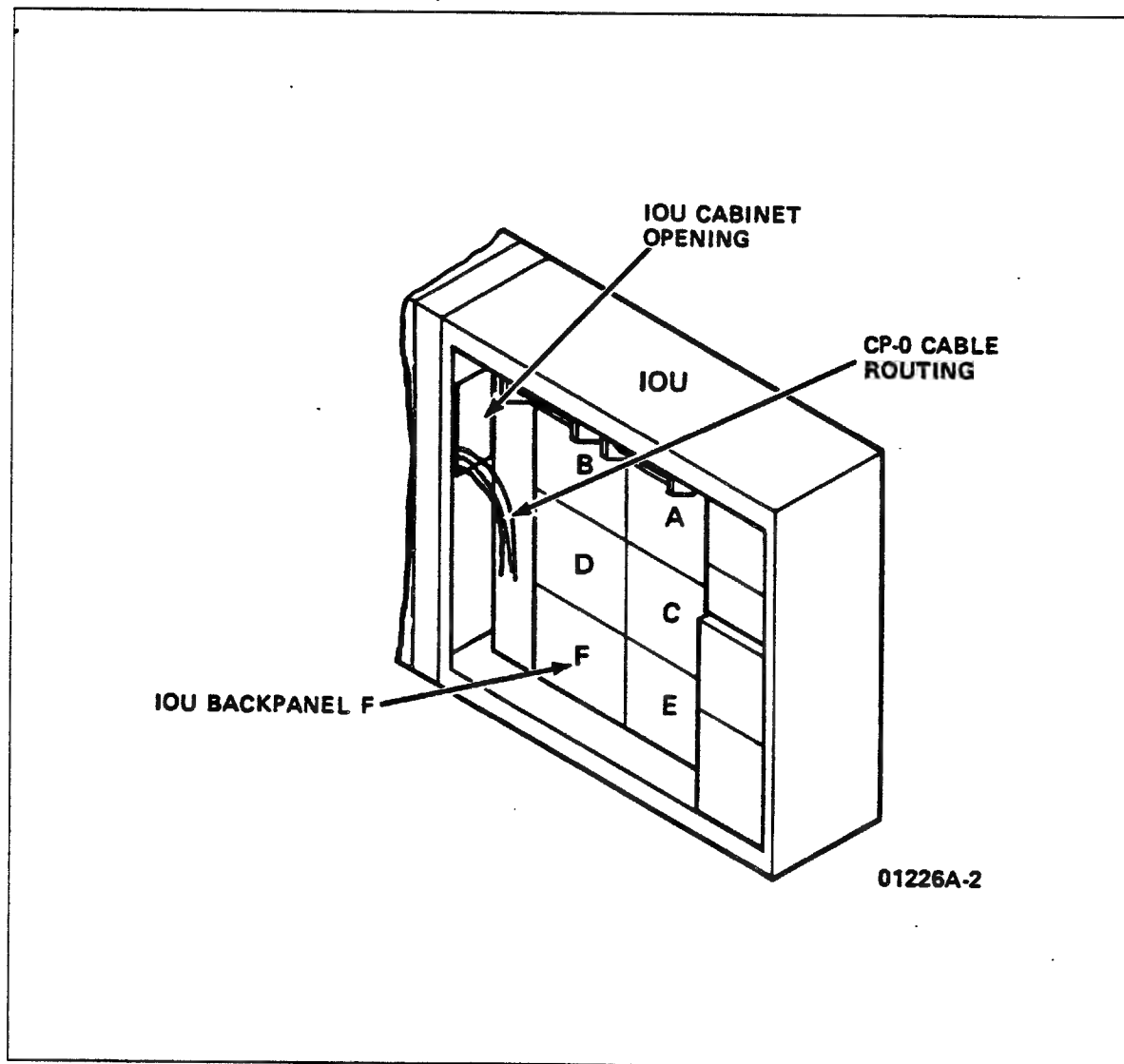


Figure 2-18. Disconnecting J70 From IOU Backpanel

Disconnect IOU Channel Cables

Use this procedure to disconnect all channel cables. Refer to figure 2-19.

Procedure prerequisites

- 50/60-Hz power is off
- 400-Hz power is off

Procedure

1. Disconnect all channel cables from the IOU connector panel marking each connector, if necessary, as it is removed.
2. Drop cables onto floor through cable cutout in raised floor.

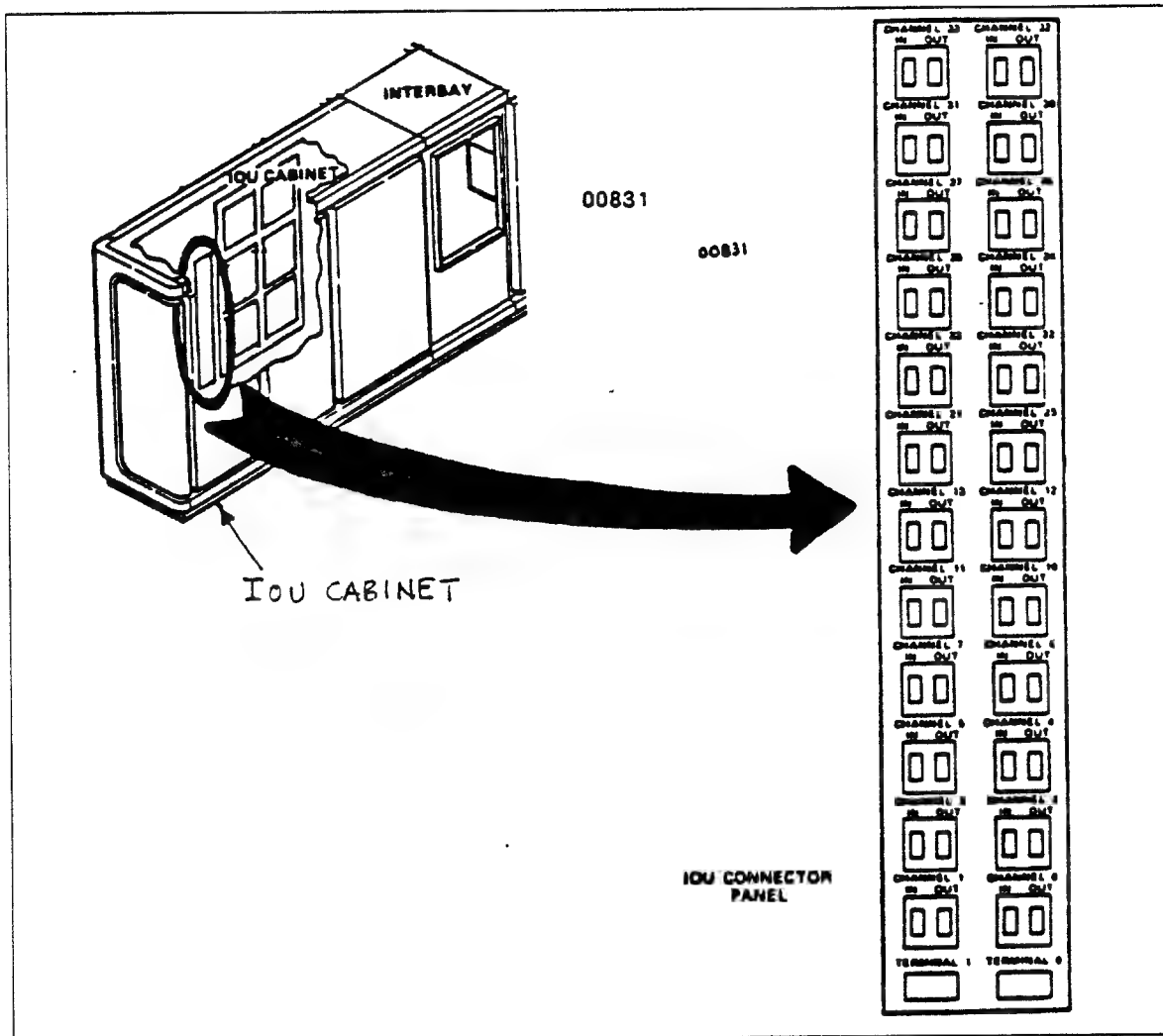


Figure 2-19. Disconnecting IOU Channel Cables

Disconnect Local/Remote Technical Assistance Cables

Use this procedure to disconnect the local/remote technical assistance cables from the IOU connector panel. Refer to figure 2-20.

Procedure prerequisites

- 50/60-Hz power is off
- 400-Hz power is off

Procedure

- 1. Disconnect modem cable from TERMINAL 0 on the IOU connector panel and from modem.
- 2. Disconnect local terminal cable from TERMINAL 1 on the IOU connector panel and from DATA SET CONNECTOR input on the CC555 local terminal. (Input connector names for terminals other than the CC555 vary).
- 3. Disconnect modem power cord from 50/60-Hz power.
- 4. Disconnect local terminal power cord from 50/60-Hz power.

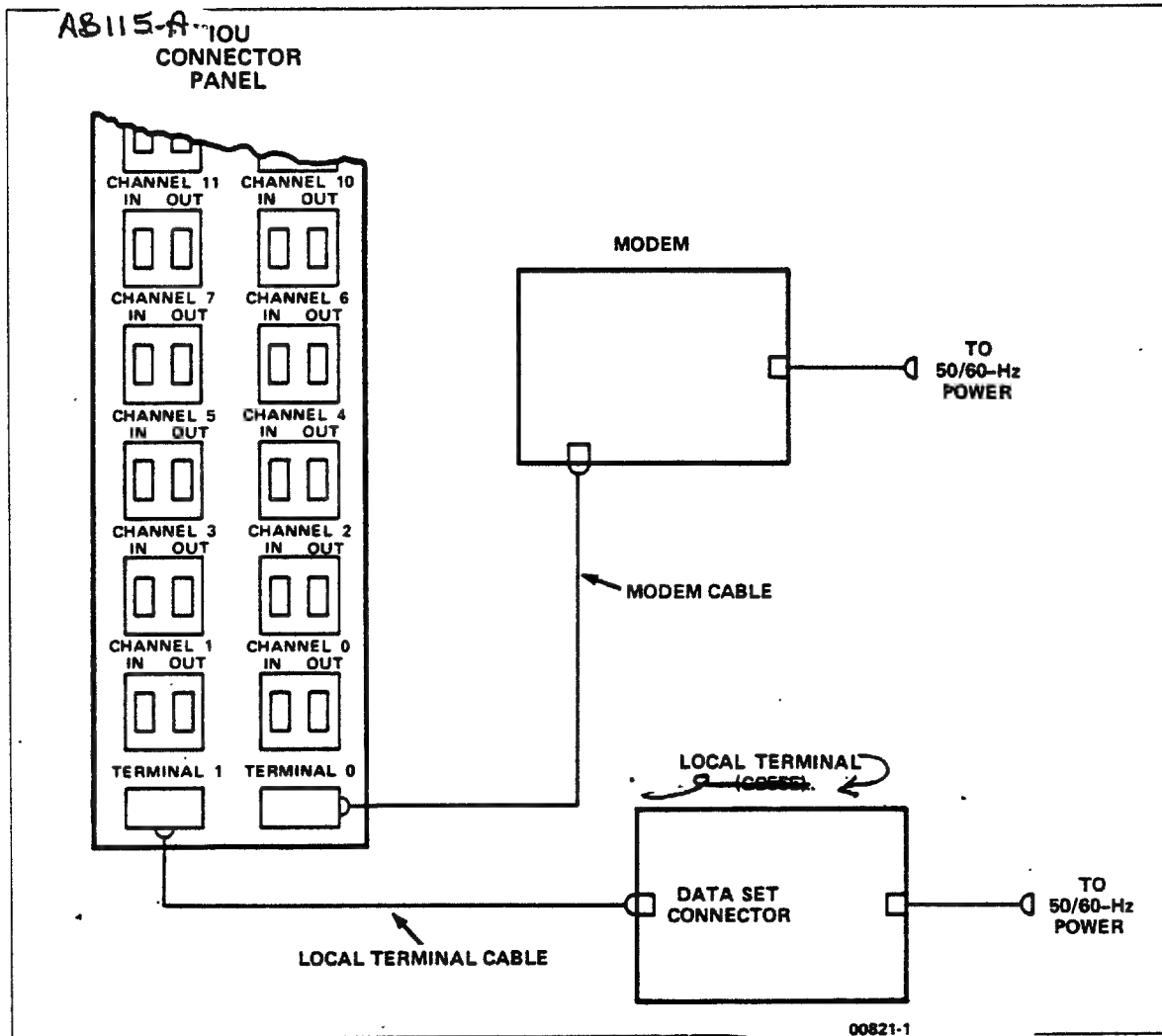


Figure 2-20. Local/Remote Technical Assistance Cables

Disconnect IOU Power Wires

Use this procedure to disconnect the 50/60- and 400-Hz power wires from the AB115-A IOU cabinet. Refer to figure 2-21.

Procedure prerequisites

- 50/60-Hz power is off
- 400-Hz power is off

Tools/parts required

- Digital multimeter, John Fluke Model 8020A or equivalent

Procedure

- ___ 1. Remove air filter assembly above power input box.
- ___ 2. Remove covers from 50/60-Hz power input boxes in IOU.
- ___ 3. Using voltmeter, verify that no voltage is present on terminals of TB1.
- ___ 4. Using a voltmeter, verify that no voltage is present on terminals of TB2.
- ___ 5. Disconnect the following power wires from IOU:
 - ___ a. 50/60-Hz power wires from TB1 and E1 (safety ground).
 - ___ b. 400-Hz power wires from TB2 and E2 (safety ground).
 - ___ c. EMC grounding strap from grid, if connected.
- ___ 6. Pull disconnected wires under floor and remove from this installation.

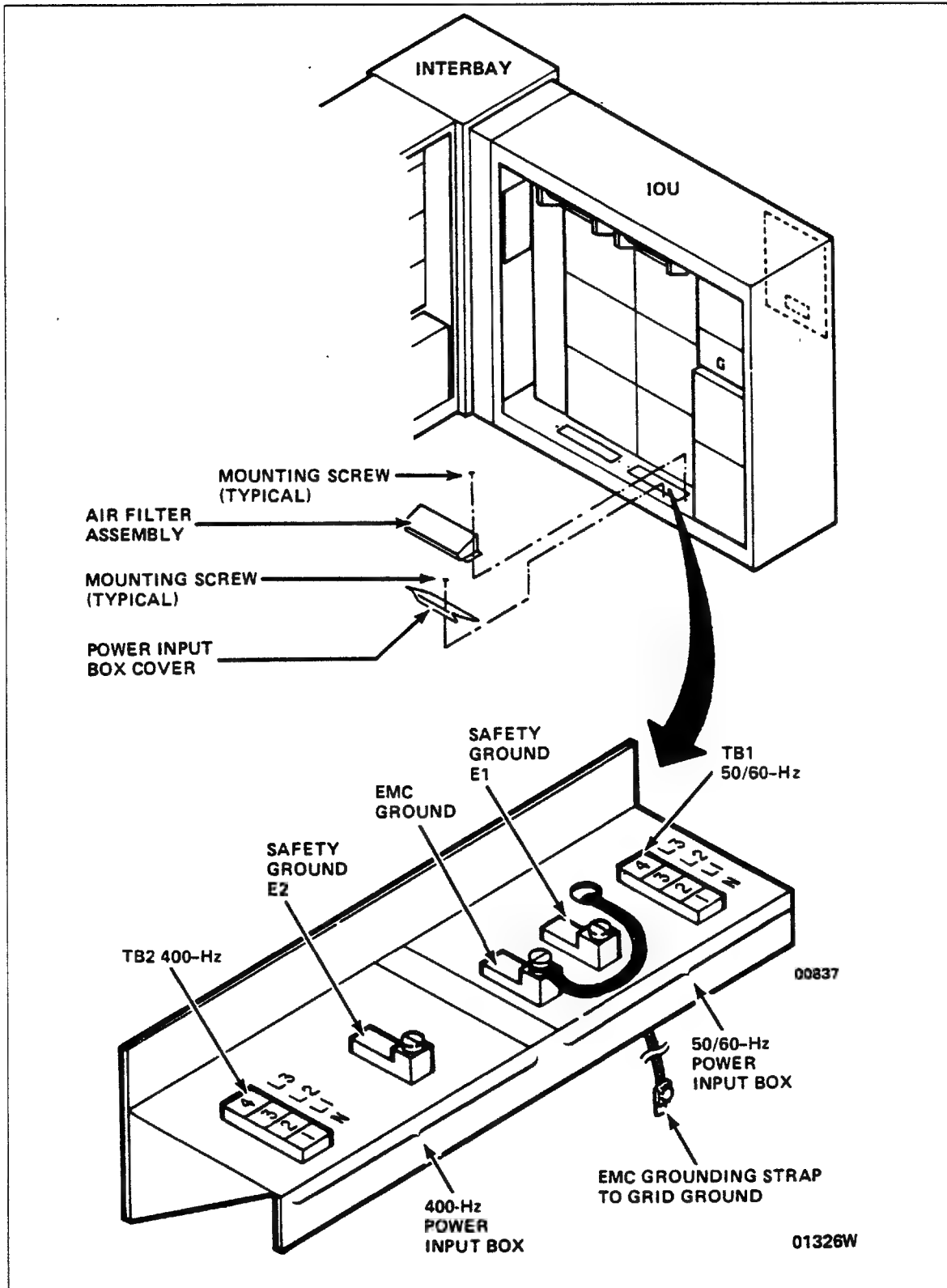


Figure 2-21. Disconnecting AB115-A IOU Power Wires

Disconnect Status and Control Cables

Use this procedure to disconnect the status and control cables from the IOU cabinet. Refer to figure 2-22.

Procedure prerequisites

- 50/60-Hz power is off
- 400-Hz power is off

Procedure

CAUTION

Completing step 4 shuts down the MG set. Power supplied by the MG set to any other computer system or to any other peripheral equipment attached to this system will also shut down. Plan ahead before beginning this procedure.

- 1. Remove cover from hinged connector panel.
- 2. Unscrew thumbscrew.
- 3. Lift hinged connector panel.
- 4. Disconnect status and control cables P1, P2, and P4 from J1, J2 and J4 on IOU hinged connector panel.
- 5. Verify that each connector is labeled for future reconnection.
- 6. Drop cables through cable cutout.

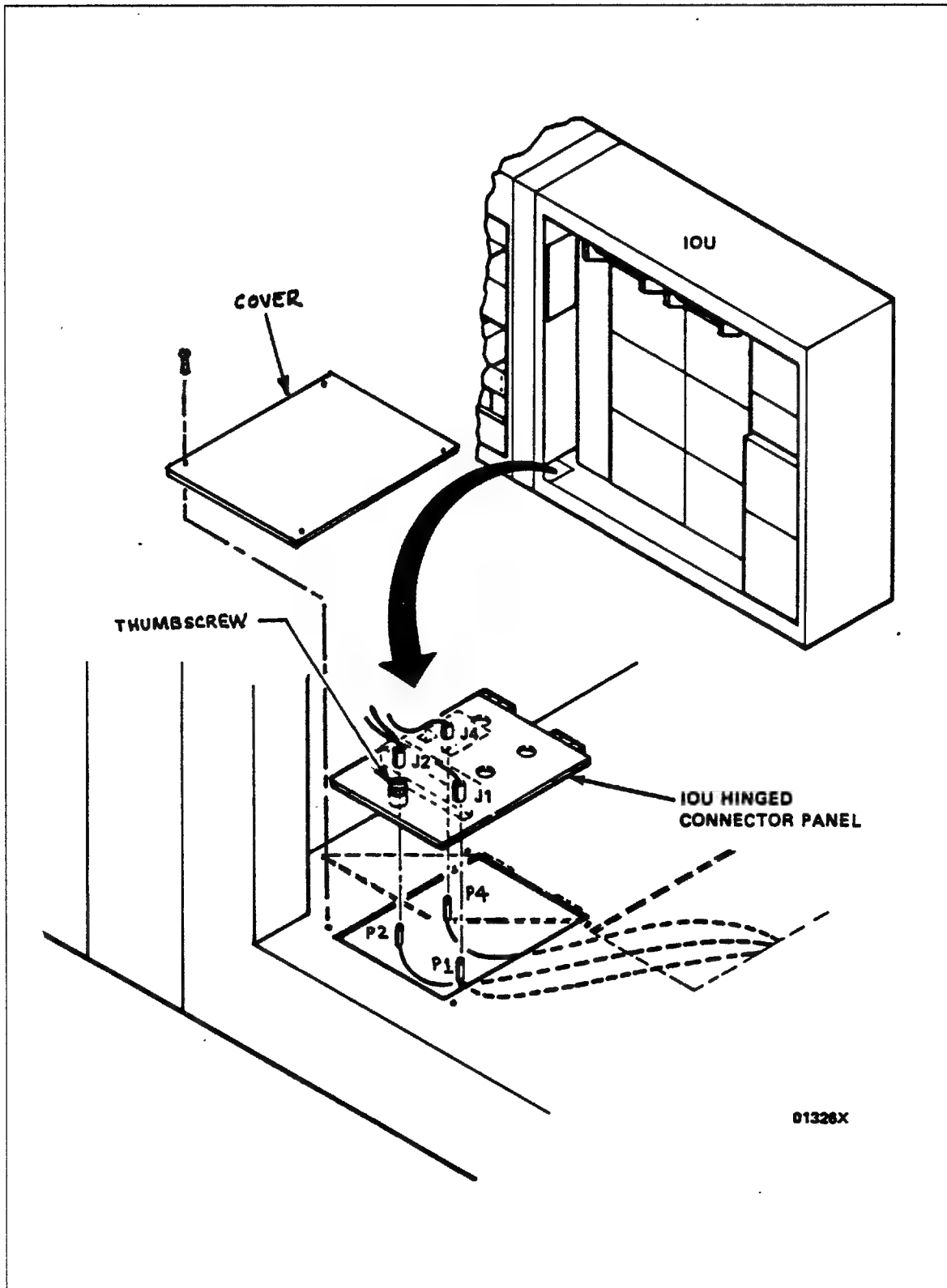


Figure 2-22. Disconnecting Status and Control Cables From IOU

Remove IOU From Computer System

Use this procedure to separate and remove the IOU from the interbay cabinet. Refer to figure 2-23.

Procedure prerequisites

- 50/60-Hz power is off
- 400-Hz power is off
- Water hoses and cables are disconnected

Tools/parts required

- Two cam-action rollers
- Two Rol-a-lifts
- Slotted screwdriver
- Two steel plates for use with cam-action rollers and Rol-a-lifts

Procedure

- 1. Remove attaching hardware (screws, lockwashers, flatwashers) that secure IOU end panel to IOU frame.
- 2. Use two cam-action rollers and one Rol-a-lift to move existing IOU away from interbay cabinet.
- 3. Remove cam-action rollers.
- 4. Use second Rol-a-lift instead of cam-action rollers to move IOU to temporary storage area to permit installation of the new IOU.

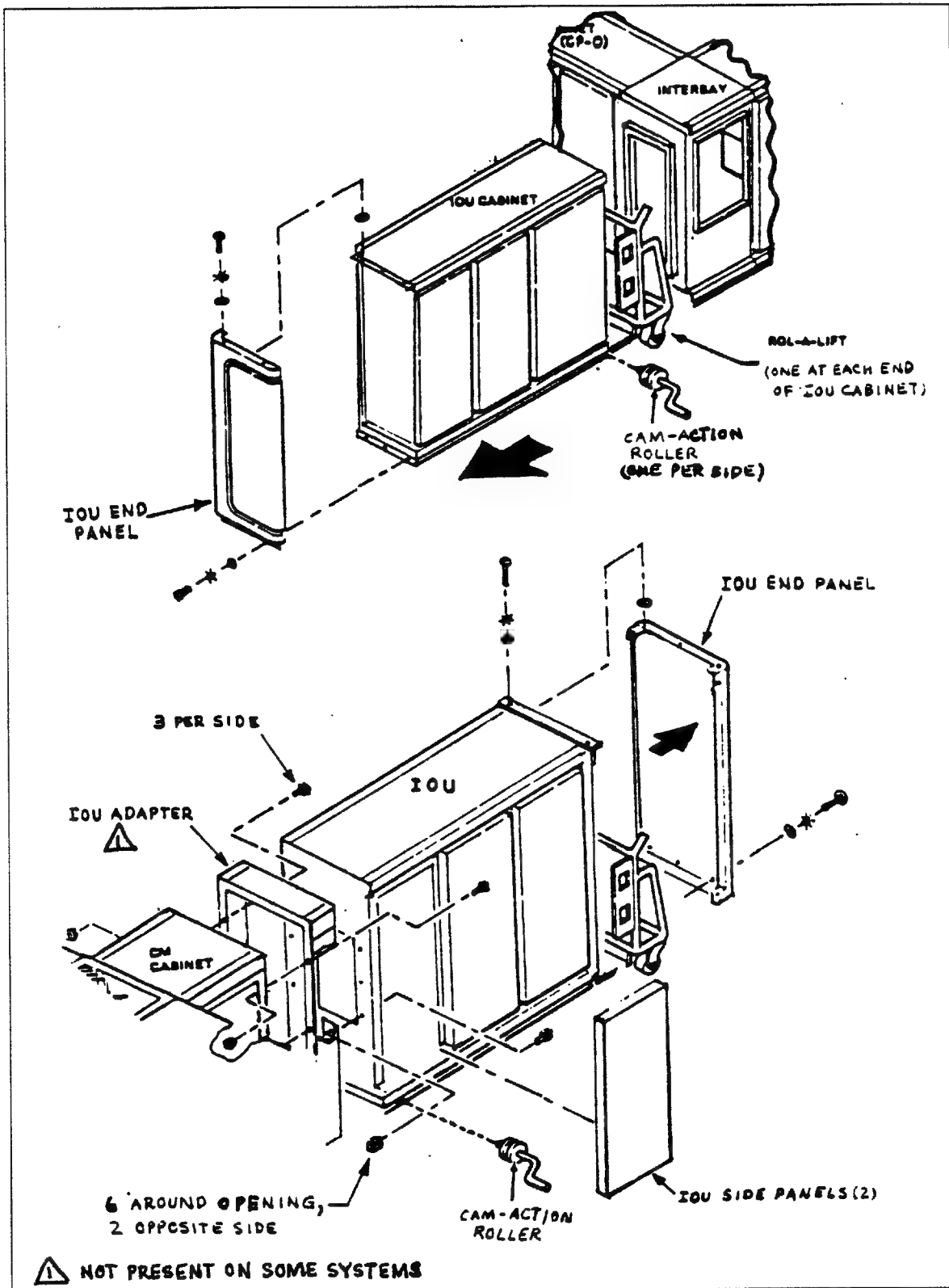


Figure 2-23. Removing IOU From Computer Systems

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Install AT478-A/AT481-A Primary IOU Cabinet

The primary IOU consists of an AT478-A IOU NIO and an AT481-A IOU CIO installed as a single cabinet in place of an AB115-A IOU. This process consists of the following tasks:

- Preinstallation Procedures for IOU Cabinets
- Install IOU Cabinet (NIO/CIO) on an 845/855 Single-CP System
- Install IOU Cabinet (NIO/CIO) on an 855 Dual-CP System
- Install IOU Cabinet (NIO/CIO) on 840, 850, or 860 Systems
- Connect IOU Water Hoses to Manifolds

Preinstallation Procedures for IOU Cabinets

Use the Section 2 Site Preparation manual shipped in the preinstallation kit to ensure that all of the specific requirements for the system have been met. Pay special attention to conditions affecting the installation of the IOU cabinets and ensure that:

- Floor is level and floor cutouts are correct (refer to figure 2-24)
- Existing plumbing is located properly and is in good condition
- Wiring is correct and appropriate for the new IOU

Since the installation of an AT478-A/AT481-A IOU most often requires the installation of a WCU, refer to chapter 5 or 6, as applicable, for IOU preinstallation procedures.

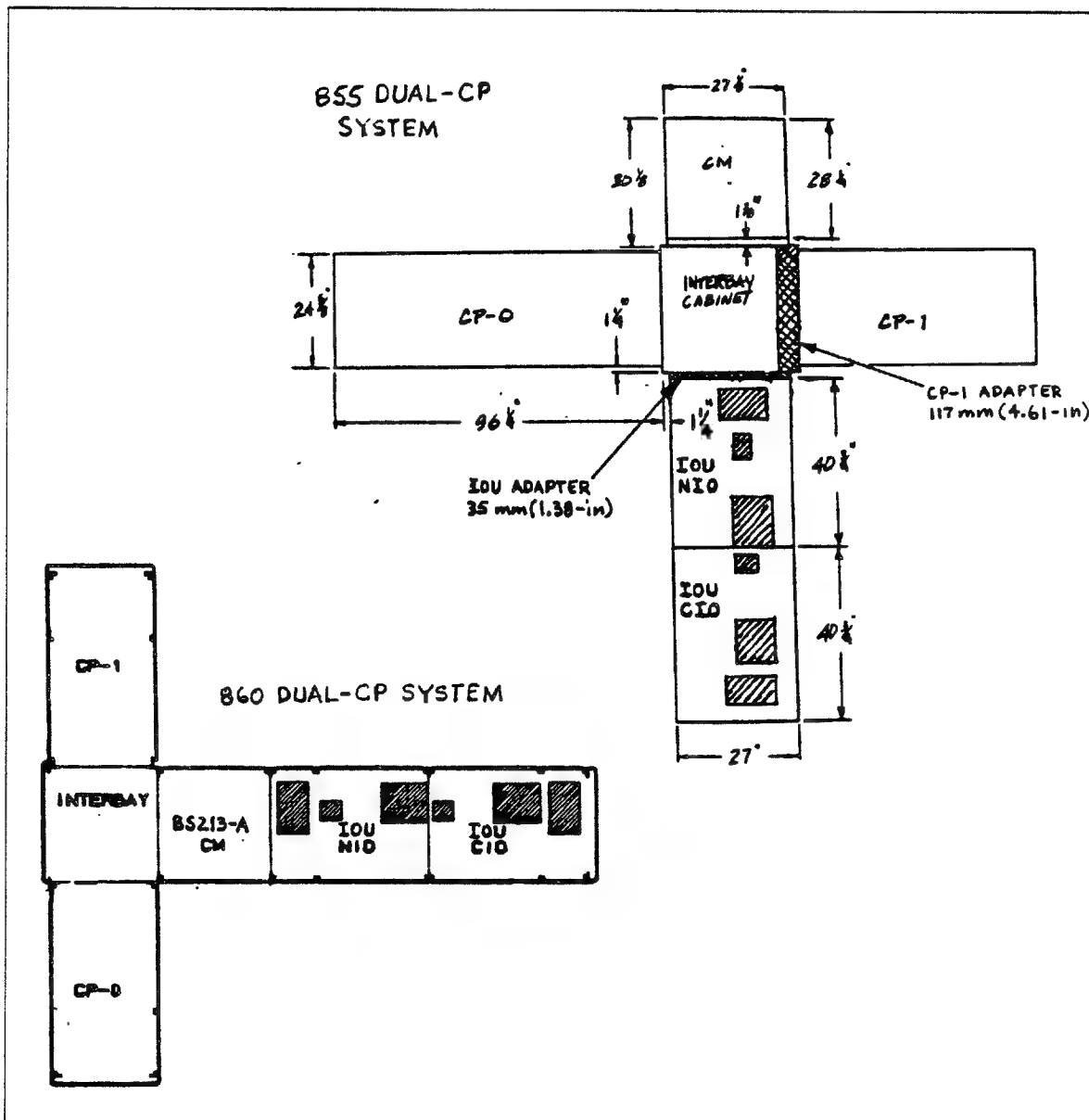


Figure 2-24. IOU NIO and CIO Floor Cutout Locations

Install IOU Cabinet (NIO/CIO) on an 845/855 Single-CP System

Use this procedure to place and bolt the optional IOU cabinets to the existing interbay cabinet at predesignated floor locations that have precut floor tiles with power and cooling cutouts for the optional cabinets. Bolting IOU cabinets to interbay occurs after their proper placement. Refer to figure 2-25.

NOTE

IS 845/855 SYSTEM SINGLE CP?

- *If yes, continue.*
 - *If no, go to next procedure.*
-

NOTE

In some installations, the locations of walls and the spacing of other equipment may require that the installers make slight adjustments to cabinet placement.

Procedure prerequisites

- Level floor
- Precut cutouts completed and correct in the raised floor tiles for power and cooling connections
- Cabinet placement defined by a floor outline
- All cabinets aligned with each other and with the floor outlines

Tools/parts required

- Two Rol-a-lifts
- Two cam-action rollers
- Two heavy-gauge steel plates required for use with cam-action rollers
- Bolting hardware: bolts, flat washers, lockwashers, nuts
- Drift pin
- Two 3/8-in drive socket wrenches, one for each installer

CAUTION

Be careful when moving a cabinet with a Rol-a-lift to prevent Rol-a-lift wheels from rolling into a floor cutout. When it is necessary to move a Rol-a-lift over a floor cutout, temporarily replace the cutout tile(s) with uncut tile(s).

Procedure

- ___ 1. Replace floor tiles with those having proper cutouts where IOU will be located.
- ___ 2. Align six holes in IOU adapter with corresponding holes in interbay cabinet.
- ___ 3. Bolt IOU adapter to interbay cabinet with 1/4 x 20 x 3/8-in bolts, washers, and nuts.
- ___ 4. Use socket wrench to tighten bolts.
- ___ 5. Position IOU NIO/CIO cabinet (as a unit) as follows:
 - ___ a. Attach Rol-a-lift to IOU CIO end of cabinet.
 - ___ b. Insert cam-action roller at bottom corner on each side of IOU NIO end of cabinet. Place heavy-gauge steel plate under each roller to protect floor.
 - ___ c. Move IOU NIO/CIO cabinet close to interbay with one installer operating each cam-action roller and one on Rol-a-lift.
 - ___ d. Remove both cam-action rollers.
- ___ 6. Open doors on both sides of IOU NIO cabinet.
- ___ 7. Position IOU NIO end of cabinet to align its eight holes with eight threaded pads on IOU adapter. Cable access holes in IOU adapter and IOU NIO cabinet should also be aligned.
- ___ 8. Remove Rol-a-lift.
- ___ 9. Use drift pin, if necessary, to improve alignment. Install 1/4 x 20 x 1/2-in bolts loosely at eight bolting locations to maintain IOU NIO/CIO cabinet alignment to IOU adapter.
- ___ 10. Use socket wrench to tighten bolts.
- ___ 11. Install an EMC clip every 3.8 cm (1.5 in) around edges of cable access holes in IOU adapter and IOU NIO cabinet.

NOTE

Before attempting to perform the Connect IOU Water Hoses to Manifolds procedure in this section, complete the Install AT478-A/AT481-A IOU Distilled Water Hoses procedure in Chapter 5.

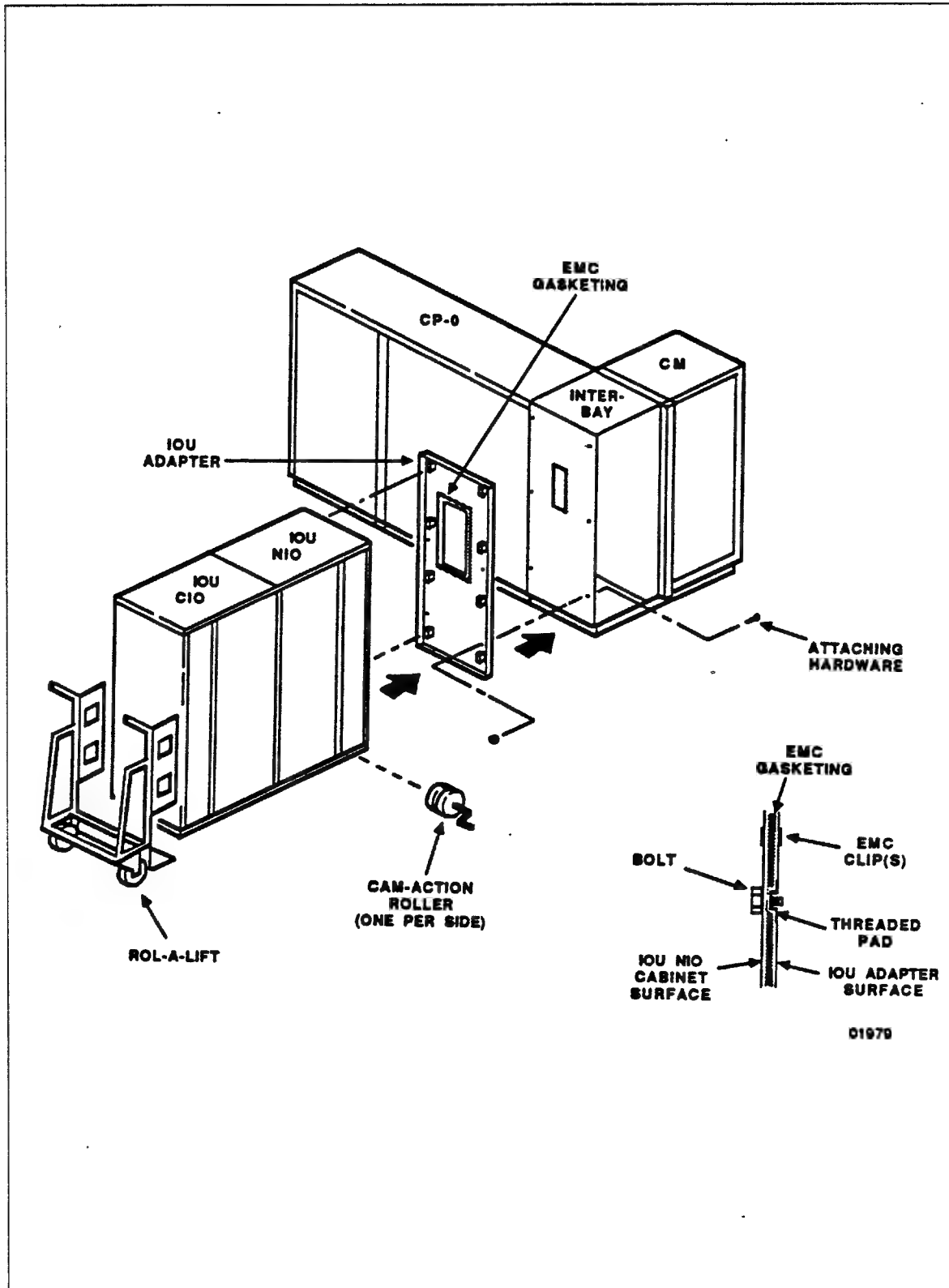


Figure 2-25. Installing IOU NIO/CIO Cabinets in 845/855 Systems

Install IOU Cabinet (NIO/CIO) on an 855 Dual-CP System

Use this procedure to place and bolt the optional IOU cabinets to the existing interbay cabinet in 855 dual-CP systems. Refer to figures 2-26 and 2-27.

NOTE

IS CP-1 PRESENT?

- *If yes, continue.*
 - *If no, go to next procedure.*
-

Procedure

- ___ 1. Open doors of CP-1 adjacent to interbay cabinet. Reach through opening to interbay and remove bolts that secure CP-1 to CP-1 adapter.
- ___ 2. Attach Rol-a-lift to outer end of CP-1 and attach cam-action rollers to interbay end.

CAUTION

The sizes of access holes for water hoses beneath CP-1 will limit the movement of CP-1. Be very careful when moving CP-1 to avoid damaging water hoses or cabling.

- ___ 3. Move CP-1 away from interbay and CP-1 adapter only sufficiently (as shown in figure) to permit access for bolting IOU cabinets (NIO/CIO) to IOU adapter and interbay cabinet.
- ___ 4. Align six holes in IOU adapter with corresponding holes in interbay cabinet.
- ___ 5. Bolt IOU adapter to interbay cabinet with 1/4 x 20 x 3/8-in bolts, washers, and nuts.
- ___ 6. Use socket wrench to tighten bolts.
- ___ 7. Position IOU NIO/CIO cabinets (as a unit) as follows:
 - ___ a. Attach Rol-a-lift to IOU CIO end of cabinet.
 - ___ b. Insert cam-action roller at the bottom corner on each side of IOU NIO end of cabinet. Place heavy-gauge steel plate under each roller to protect floor.
 - ___ c. Move IOU NIO/CIO cabinet close to interbay with one installer operating each cam-action roller and one on the Rol-a-lift.
 - ___ d. Remove both cam-action rollers.
- ___ 8. Open doors on both sides at IOU NIO cabinet.
- ___ 9. Position IOU NIO end of cabinet to align its eight holes with eight threaded pads on IOU adapter. Cable access holes in IOU adapter and IOU NIO cabinet should also be aligned.

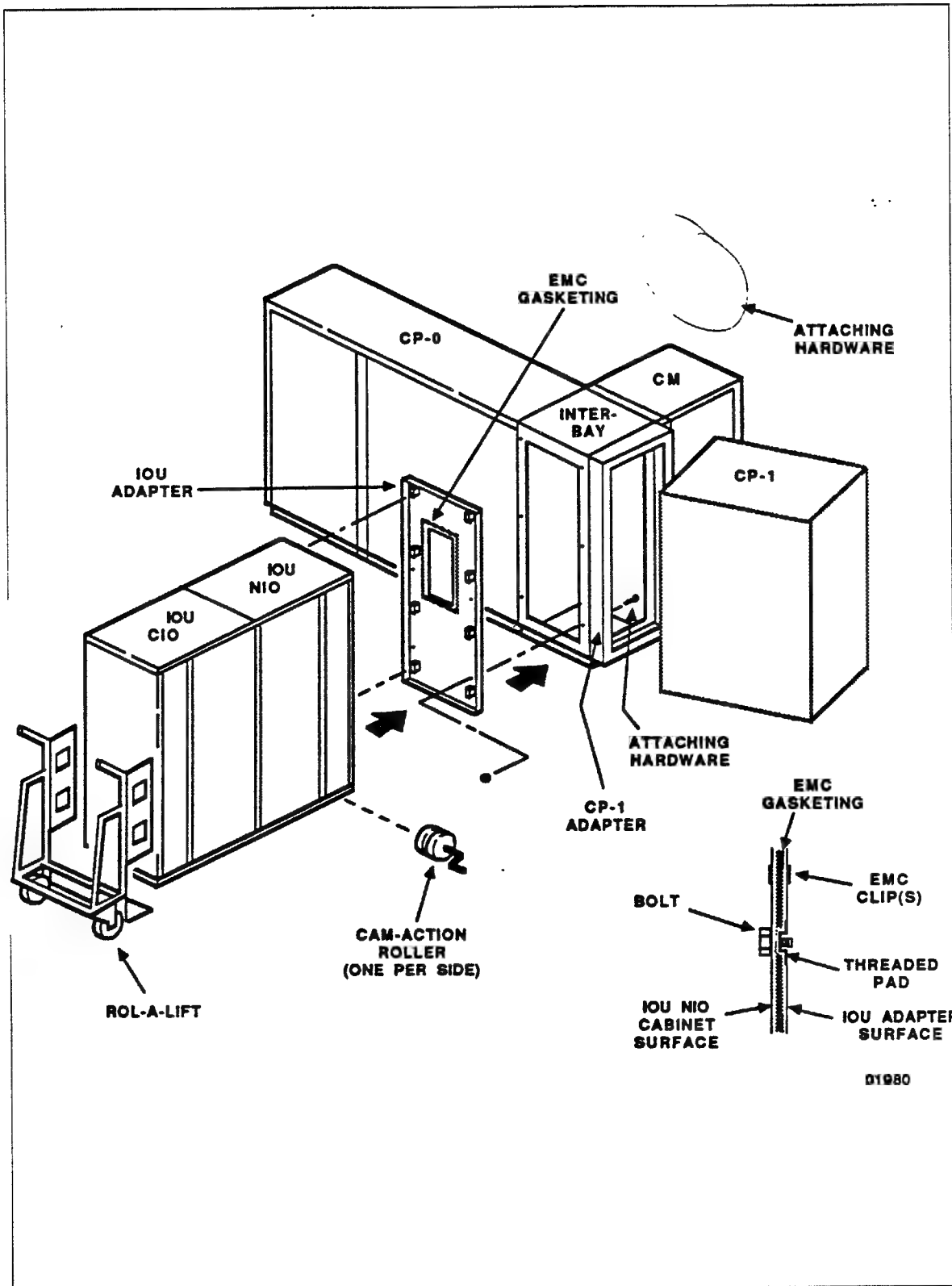


Figure 2-26. Installing IOU NIO/CIO Cabinets in 855 Dual-CP Systems

- ___ 10. Remove Rol-a-lift.
- ___ 11. Use drift pin, if necessary, to improve alignment. Install 1/4 x 20 x 1/2-in bolts loosely at eight bolting locations to secure IOU NIO/CIO cabinet to IOU adapter.
- ___ 12. Use socket wrench to tighten bolts.
- ___ 13. Install EMC clip every 3.8 cm (1.5 in) around edges of cable access holes in IOU adapter and IOU NIO cabinet.
- ___ 14. Push CP-1 back into position with Rol-a-lift and cam-action rollers.
- ___ 15. Realign CP-1 and CP-1 adapter bolting holes using cabinet openings for access to install bolts.
- ___ 16. Insert bolts in CP-1 and CP-1 adapter bolting holes finger tight.
- ___ 17. Recheck cabinet alignment and tighten bolts to secure CP-1 to CP-1 adapter.

NOTE

IS CP-1 PRESENT?

- *If yes, continue with step 18.*
 - *If no, go to step 21.*
-

- ___ 18. Remove each of CP-1 doors adjacent to interbay cabinet as follows:
 - ___ a. Open door and lift it upward.

WARNING

To prevent bending top door hinge pin, do not tilt door more than necessary during removal.

- ___ b. Tilt bottom of door slightly to one side, just enough to clear bottom hinge pin.
 - ___ c. Lower door off of top hinge pin.
- ___ 19. Reach through Interbay cabinet opening and remove bolts that secure CP-1 cabinet to Interbay cabinet.
- ___ 20. Using Rol-a-lift on the outer end of CP-1 and cam-action rollers at the interbay end, move CP-1 away from Interbay cabinet at angle similar to that shown on figure. This permits access for bolting IOU NIO/CIO cabinets to IOU adapter and interbay cabinet.
- ___ 21. Bolt IOU NIO/CIO cabinets to Interbay cabinet at eight locations as shown in figure. Tighten bolts.
- ___ 22. Push CP-1 back into position and use cabinet openings for access to reinstall bolts that secure CP-1 to interbay cabinet. Tighten bolts.

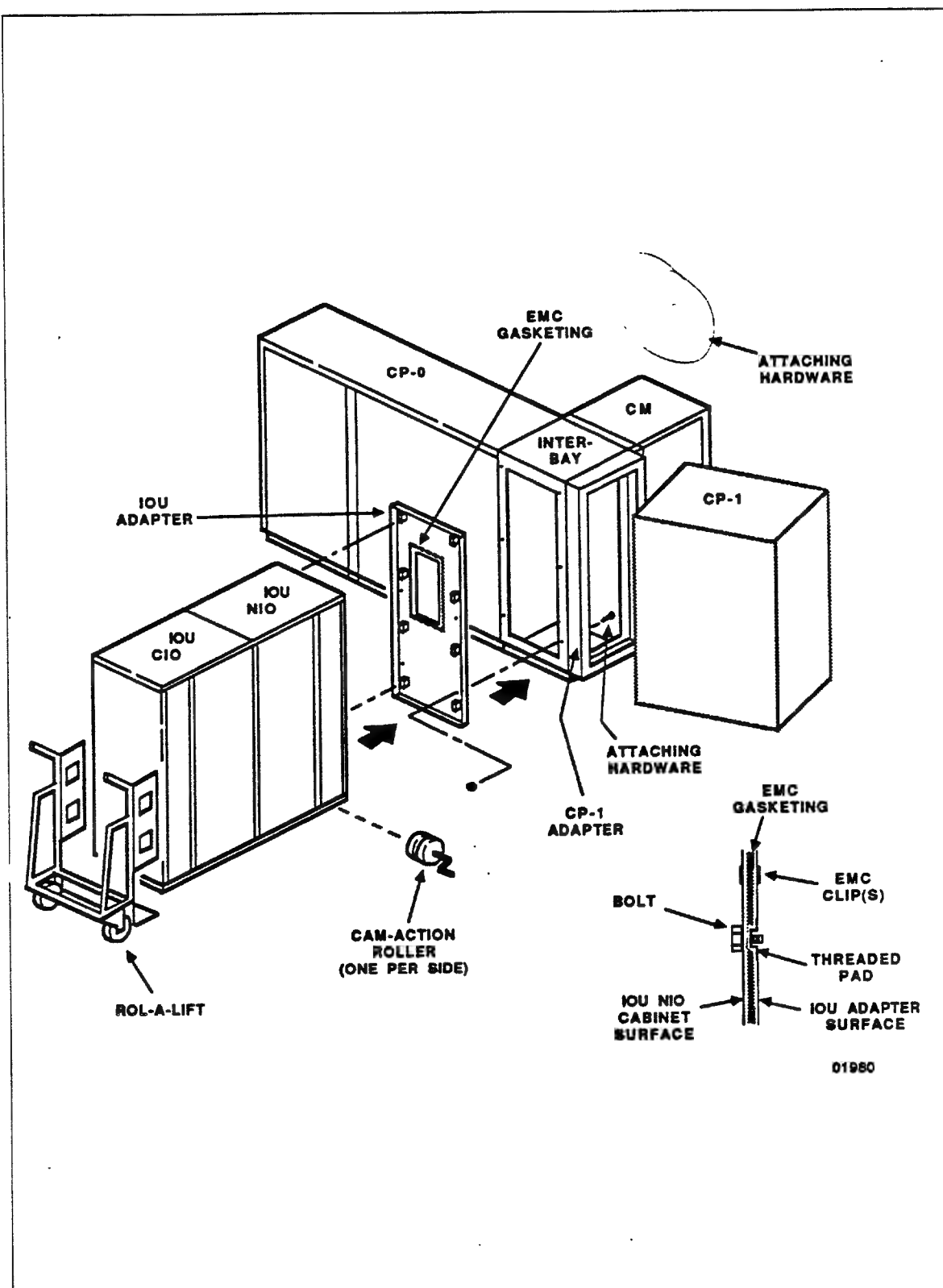


Figure 2-27. Installing IOU NIO/CIO Cabinets in 855 Dual-CP Systems

Install IOU Cabinet (NIO/CIO) on 840, 850, or 860 Systems

Use this procedure to place and bolt the optional IOU cabinets (NIO/CIO) at predesignated floor locations that have precut floor tiles with power and cooling cutouts for the optional cabinets. Bolting cabinets occurs after their proper placement. Refer to figure 2-28.

Procedure prerequisites

- Level floor
- Precut cutouts completed and correct in raised floor tiles for power and cooling connections
- A floor outline that defines the placement of cabinets
- All cabinets aligned with each other and with floor outlines

Tools/parts required

- Two Rol-a-lifts
- Two cam-action rollers
- Two heavy-gauge steel plates required for use with cam-action rollers
- Bolting hardware: bolts, flatwashers, lockwashers, nuts
- Drift pin
- Two 3/8-in drive socket wrenches, one for each installer

CAUTION

When moving a unit with Rol-a-lifts, be careful to prevent wheels from rolling into a floor cutout. When it is necessary to move a Rol-a-lift-over a floor cutout, temporarily replace cutout tile(s) with uncut tile(s).

Procedure

- 1. Remove bolts that secure IOU adapter to CM and remove IOU adapter.
- 2. Using two Rol-a-lifts with padding between Rol-a-lifts and cabinet to protect cabinet, move IOU NIO/CIO cabinets as a unit into close proximity of CM cabinet.
- 3. Remove Rol-a-lift from IOU NIO end.
- 4. Install cam-action rollers on IOU NIO end of cabinet.
- 5. Using Rol-a-lift still attached to IOU CIO end of cabinet and cam-action rollers, carefully move IOU NIO/CIO cabinet into alignment with CM.
- 6. Open IOU and CM doors as necessary to gain access to bolting areas.
- 7. Align bolt holes of IOU NIO end of cabinet with CM cabinet using drift pin if necessary and install bolts loosely at eight locations to secure IOU NIO/CIO cabinet to CM cabinet.
- 8. Tighten bolts.

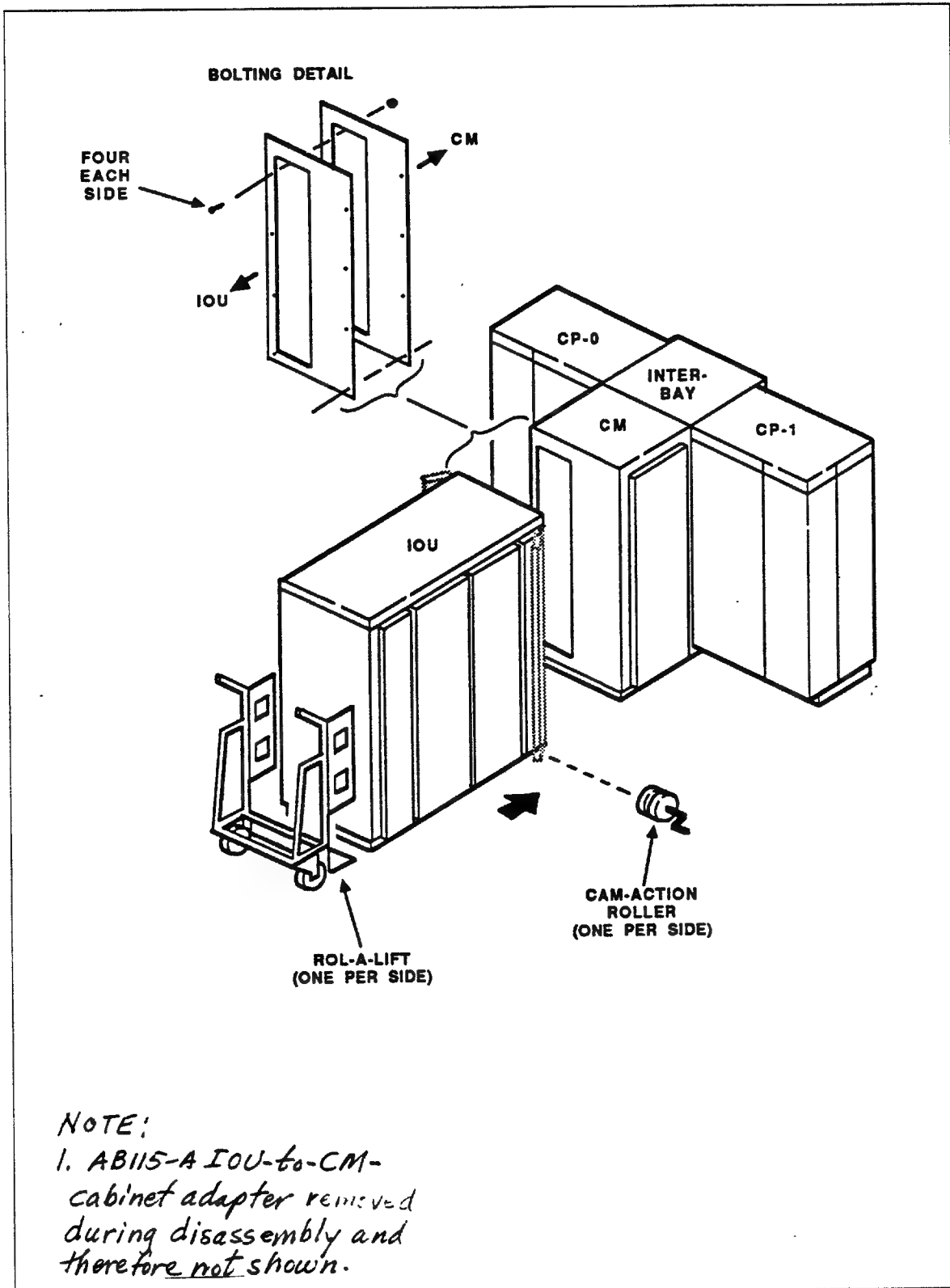


Figure 2-28. Installing IOU NIO/CIO Cabinets in 840/850/860 Systems

Connect IOU Water Hoses to Manifolds

Use this procedure to connect supply and return water hoses between the IOU NIO and CIO cabinets and 3-port manifolds. Refer to figure 2-29.

Procedure prerequisites

- Water cooling unit must be installed.
- Supply and return hoses for the IOU NIO and CIO cabinets have been routed under raised floor and connected between water cooling unit and the necessary manifolds..
- Bolting of IOU cabinets is complete.

Procedure

NOTE

Some steps or parts of steps in this procedure may have been completed previously.

- 1. Remove floor tiles above site water supply and return valves and shut off all water to computer system.
- 2. Remove three retaining screws, lockwashers and cover plate near bottom of IOU NIO cabinet.
- 3. Remove retaining screw and lockwasher from lower left corner of hinged power distribution box.
- 4. Open power distribution box to gain access to water supply and return connections.
- 5. Remove floor tiles, as necessary, in front of IOU NIO cabinet.
- 6. Route water hoses under raised floor between manifolds and IOU NIO cabinets.
- 7. Remove protective plugs from hose ends, if required. Store plugs at site.
- 8. Pull unconnected hose ends up through floor and cabinet water cutouts to connections in IOU NIO cabinet.

CAUTION

- Ensure that supply hose quick disconnect connects to the SUPPLY connection in IOU NIO cabinet and that return hose quick disconnect connects to RETURN connection in IOU NIO cabinet. IOU NIO cabinet does not cool properly if these connections are reversed.
 - Cover power distribution box with a piece of plastic for protection from water in the event of a quick-disconnect malfunction.
-
- 9. Connect supply and return hoses to supply and return connections in IOU NIO cabinet. Verify that hoses are connected to correct connections.
 - 10. Close power distribution box. Do not reinstall retaining screw or cover plate at this time.

___ 11. Repeat this procedure for IOU CIO cabinet.

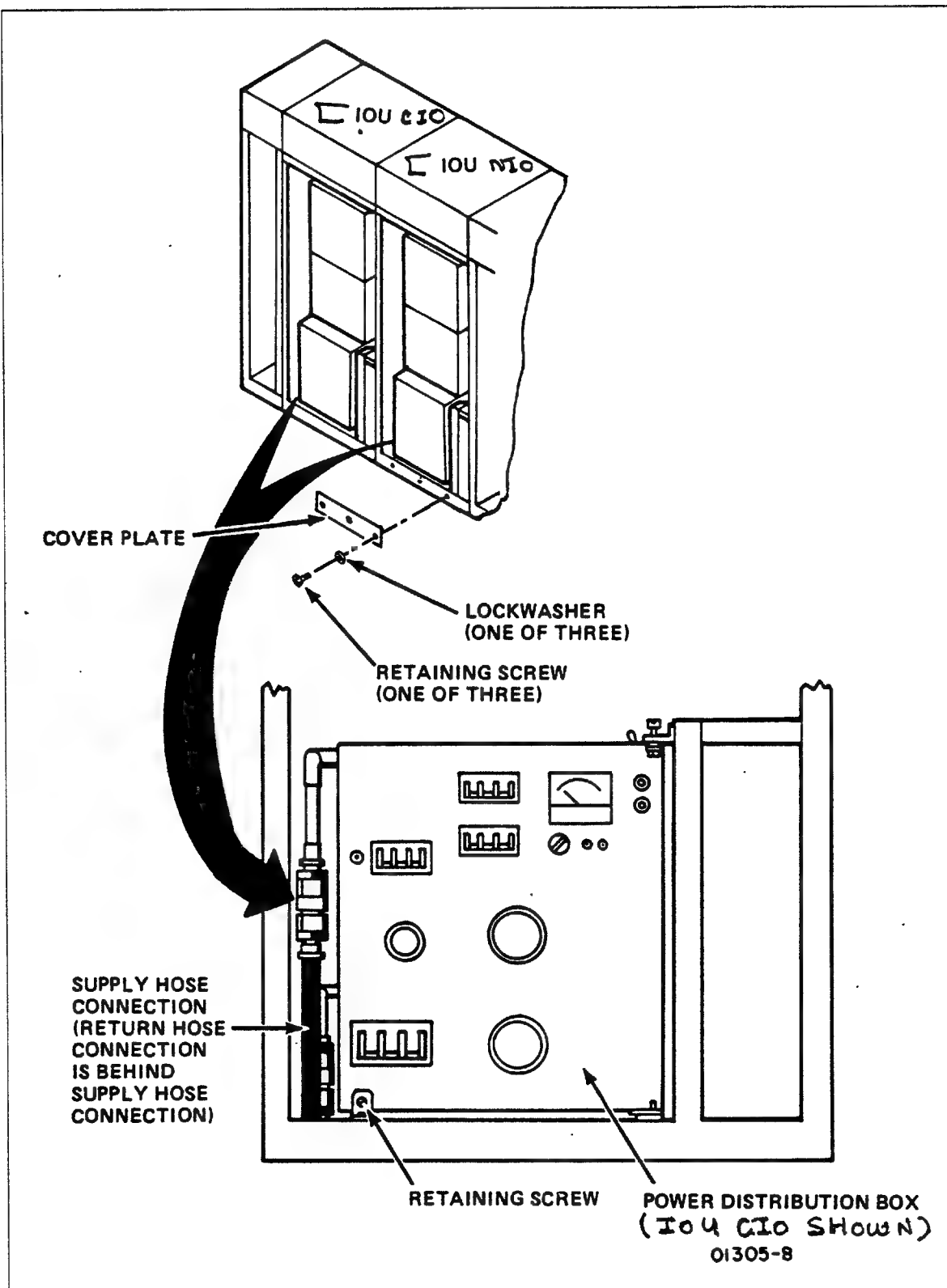


Figure 2-29. Supply and Return Water Hose Connections to IOU

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Connect Primary IOU Cables

This section contains the procedures necessary to connect cables to the primary IOU.

Cabling prerequisites:

- Primary IOU installation is complete and power is off

Cable installation includes the following tasks:

- Connect Channel Cables to IOU NIO
- Connect CP-0 Data Cables to IOU NIO Backpanel A
- Connect Clock Cable
- Connect Fault-Sense Cables to CM Multiplexer Board
- Connect SPCP Status and Control Cables
- Connect SPM Status and Control Cables

Tools/Parts required

- Antistatic smock
- Antistatic wrist strap
- Diagonal cutter or knife
- Phillips screwdriver
- Slotted screwdriver
- Cable ties

CAUTION

Wear an antistatic smock throughout the installation to prevent damage to microcircuits. Also, wear and use an antistatic wrist strap when connecting all cables to prevent damage to microcircuits.

Use care in handling and connecting all cables to prevent damage to the cable connections on the connectors and the connector pins and jacks.

Connect Channel Cables to IOU NIO

Use this procedure to connect cables to the cable connector panel in the IOU NIO cabinet. Record the connections for future reference. Refer to figure 2-30.

Prerequisites

- Bolting of IOU NIO/CIO cabinets is complete
- Connecting water hoses is complete

Procedure

- 1. Pull channel cables up through floor cutout to IOU NIO cabinet cable connector panel.
- 2. Connect channel cables to IOU NIO cabinet cable connector panel following bottom-to-top order. Starting at the bottom provides the greatest accessibility to cable connectors on panel.
- 3. Record channel cable connections in table 2-2 for future reference.

Table 2-2. IOU NIO Channel Cable Connector Assignments

NIO Connector Panel Designators	Connections to Peripheral Equipment	NIO Connector Panel Designators	Connections to Peripheral Equipment
Channel 0		Channel 1	
Channel 2		Channel 3	
Channel 4		Channel 5	
Channel 6		Channel 7	
Channel 10		Channel 11	
Channel 12		Channel 13	
Channel 20		Channel 21	
Channel 22		Channel 23	
Channel 24		Channel 25	
Channel 26		Channel 27	
Channel 30		Channel 31	
Channel 32		Channel 33	

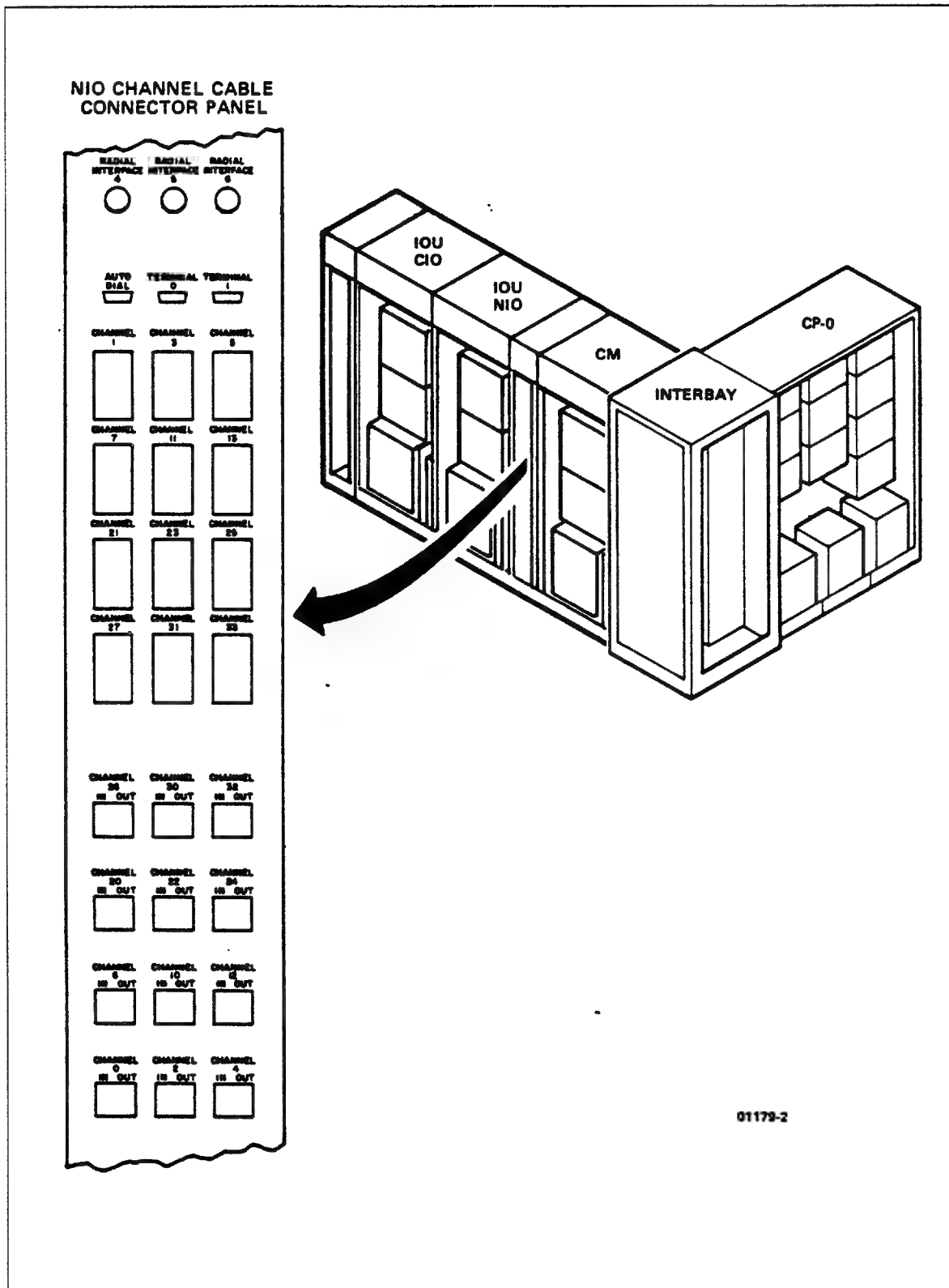


Figure 2-30. IOU NIO Cable Connector Panel

Connect CP-0 Data Cables to IOU NIO Backpanel A

Use this procedure to route CP-0 data cables through the interbay and CM cabinets and connect them to the IOU NIO backpanel A. Refer to figures 2-31 and 2-32.

Tools/parts required

- Diagonal cutter
- Antistatic wrist strap

Procedure

CAUTION

Use an antistatic wrist strap when connecting all data cables. This is essential for preventing damage to microcircuits.

Be careful when handling and connecting all cables to prevent damage to cable connections on connectors and to connector pins and jacks.

- 1. Connect an antistatic wrist strap from your wrist to frame ground.
- 2. Locate seven black-sheathed cables, labeled J50 through J72, removed from IOU and temporarily coiled in interbay cabinet.
- 3. If the seven cables are secured with cable tie, cut it and route cables through CM and into IOU NIO cabinet openings to backpanel A. Route only enough length of cables to reach backpanel.

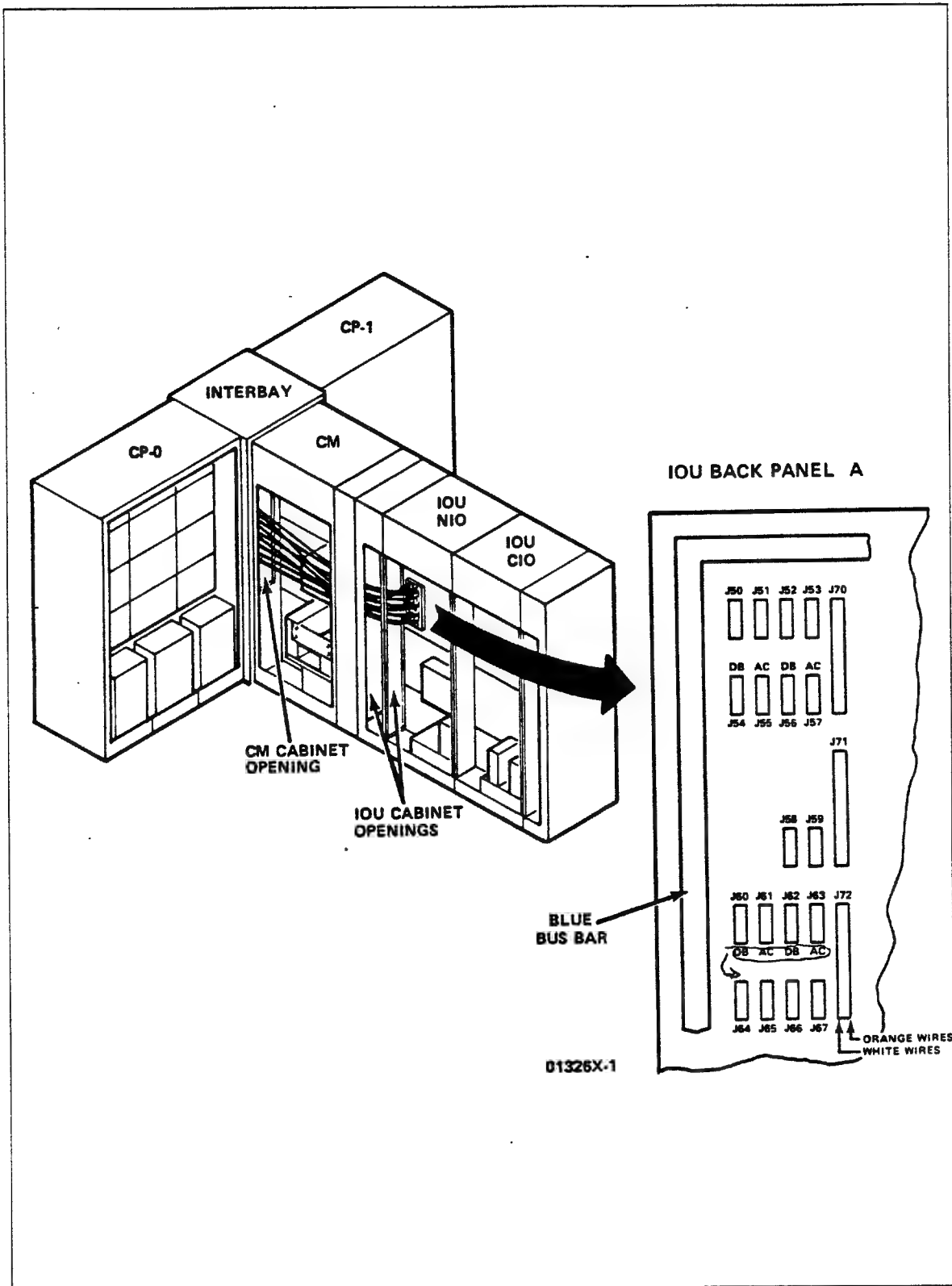


Figure 2-31. Connecting CP-0 Data Cables to IOU NIO

- 4. Connect connectors J50 through J67 in the order listed in table 2-3.

Table 2-3. IOU NIO Backpanel A Cable Connections

Connector Designators on CP-0 Cable Ends	Connector Designators on Backpanel A
J64	J64
J65	J65
J66	J66
J67	J67
J60	J60
J61	J61
J62	J62
J63	J63
J58	J58
J59	J59
J54	J54
J55	J55
J56	J56
J57	J57
J50	J50
J51	J51
J52	J52
J53	J53

Notes:

1. Connect **odd-numbered** connectors to signal wires in column A, and braided ground wires to column C.
2. Connect **even-numbered** connectors to signal wires in column B, and braided ground wires to column D.
3. Connecting cables in the order shown in the table is the most efficient order of connection.

- 5. Locate cable, consisting of white and orange twisted-pair wires, inside interbay cabinet with unconnected connector labeled J70. The other end of this cable originates at CP-0 ZIF cage locations C1AD3, C1AD4, and C1AD5.
- 6. Route J70 cable through CM to IOU NIO backpanel A. Route only enough cable to reach backpanel.
- 7. Connect J70 to IOU NIO backpanel A, connector J70, positioning connector so that its white wires are on the B-pin column and its orange wires are on the A-pin column.

NOTE**IS CP-1 PRESENT?**

- If yes, continue.
- If no, go to next procedure.

- 8. Route J72 cable through CM to IOU NIO backpanel A. Route only enough cable to reach backpanel.
- 9. Connect J72 cable from CP-1 to IOU backpanel A, connector J72, positioning connector so white wires are on B pin column and orange wires are on A pin column.

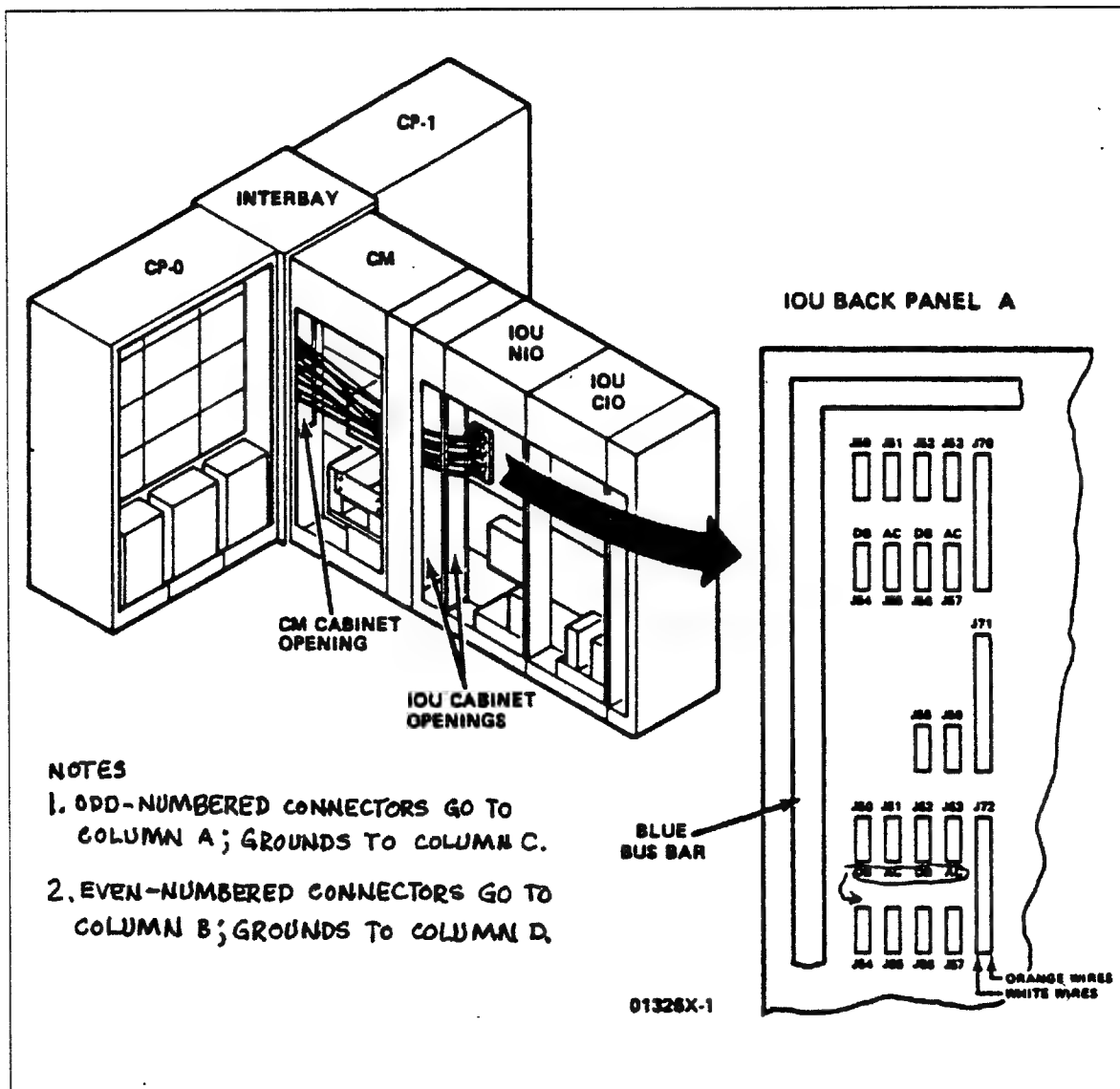


Figure 2-32. Connecting CP-1 Data Cables to IOU NIO

Connect Clock Cables

Use this procedure to route and connect clock cables from the CM cabinet to the IOU NIO cabinet. Clock cables should still be connected to the CM. Refer to figure 2-33.

Tools/parts required

- Clock terminator plugs (PN 53695211), as required
- Antistatic wrist strap

Procedure

CAUTION

Use an antistatic wrist strap when connecting all data cables. This is essential for preventing damage to microcircuits.

Be careful when handling and connecting all cables to prevent damage to the cable connections on the connectors and to the connector pins and jacks.

- 1. Connect antistatic wrist strap from your wrist to frame ground.
- 2. Locate two CM clock cables temporarily coiled in interbay cabinet.
- 3. Route and connect cables to J40 and J41 on IOU NIO clock connector panel.

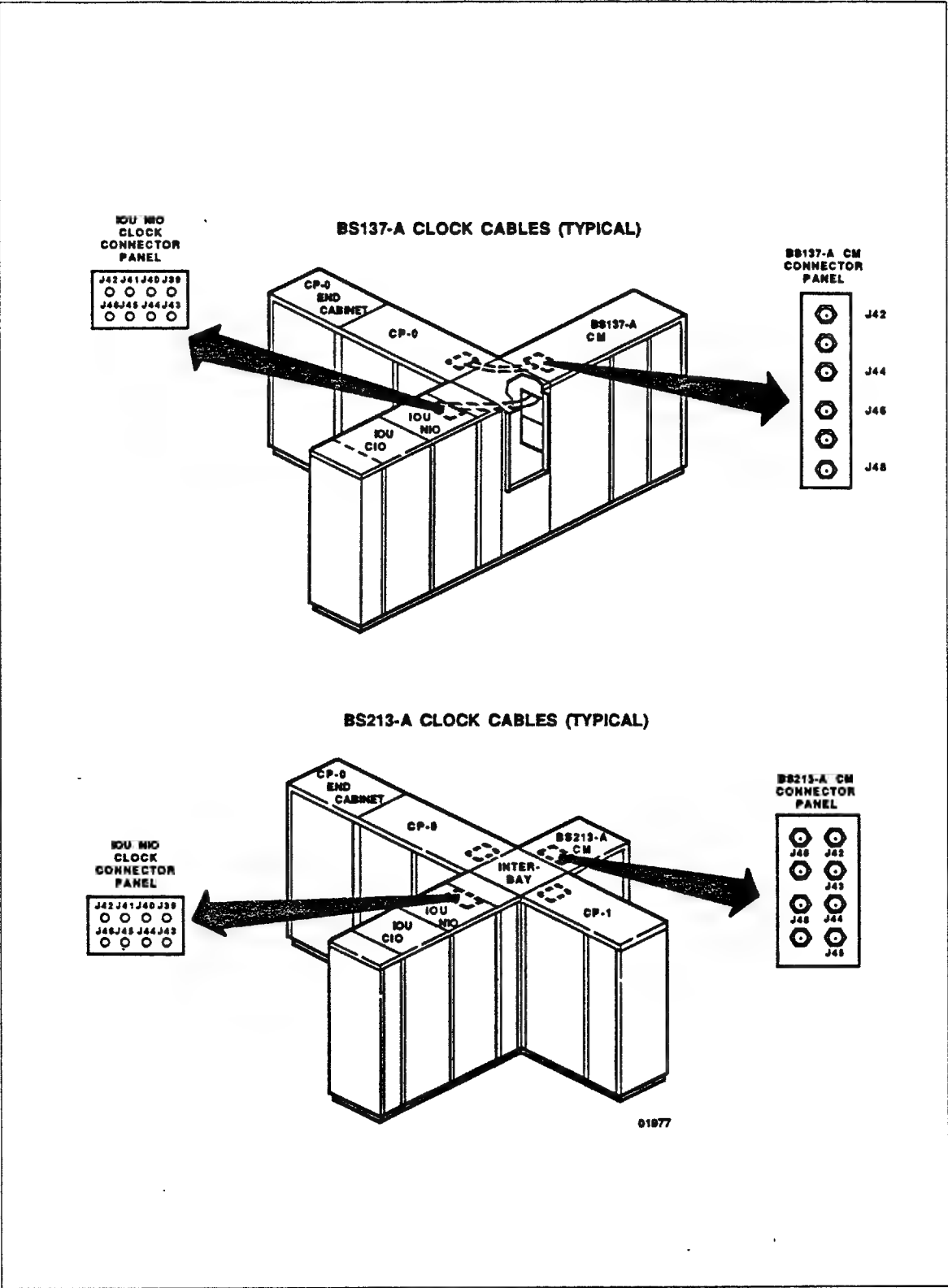


Figure 2-33. Clock Cable Connections

Connect Fault-Sense Cables to CM Multiplexer Board

Use this procedure to route and connect the fault-sense cables from the IOU NIO and IOU CIO cabinets to the multiplexer board in the CM cabinet. Refer to figure 2-34.

NOTE: THIS PROCEDURE DOES NOT APPLY TO 855 SYSTEMS.

Procedure prerequisites

- Bolting of the central computer units is complete

Tools/parts required

- Antistatic wrist strap

Procedure

CAUTION

Use antistatic wrist strap when connecting all data cables. This is essential for preventing damage to microcircuits.

Be careful when handling and connecting all cables to prevent damage to cable connections on connectors and to connector pins and jacks.

- 1. Connect antistatic wrist strap from your wrist to frame ground.

CAUTION

Be careful to prevent bending or breaking of connector pins on the multiplexer board.

- 2. Locate fault-sense cable (P2) in IOU NIO cabinet. Cable has label for CM multiplexer board connector J2.
- 3. Route cable to CM multiplexer board, and connect it to J2.
- 4. Locate fault-sense cable (P2) in IOU CIO cabinet. Cable has label for CM multiplexer board connector J3.
- 5. Route cable through IOU NIO cabinet to CM multiplexer board, and connect it to J3, label side of connector out.

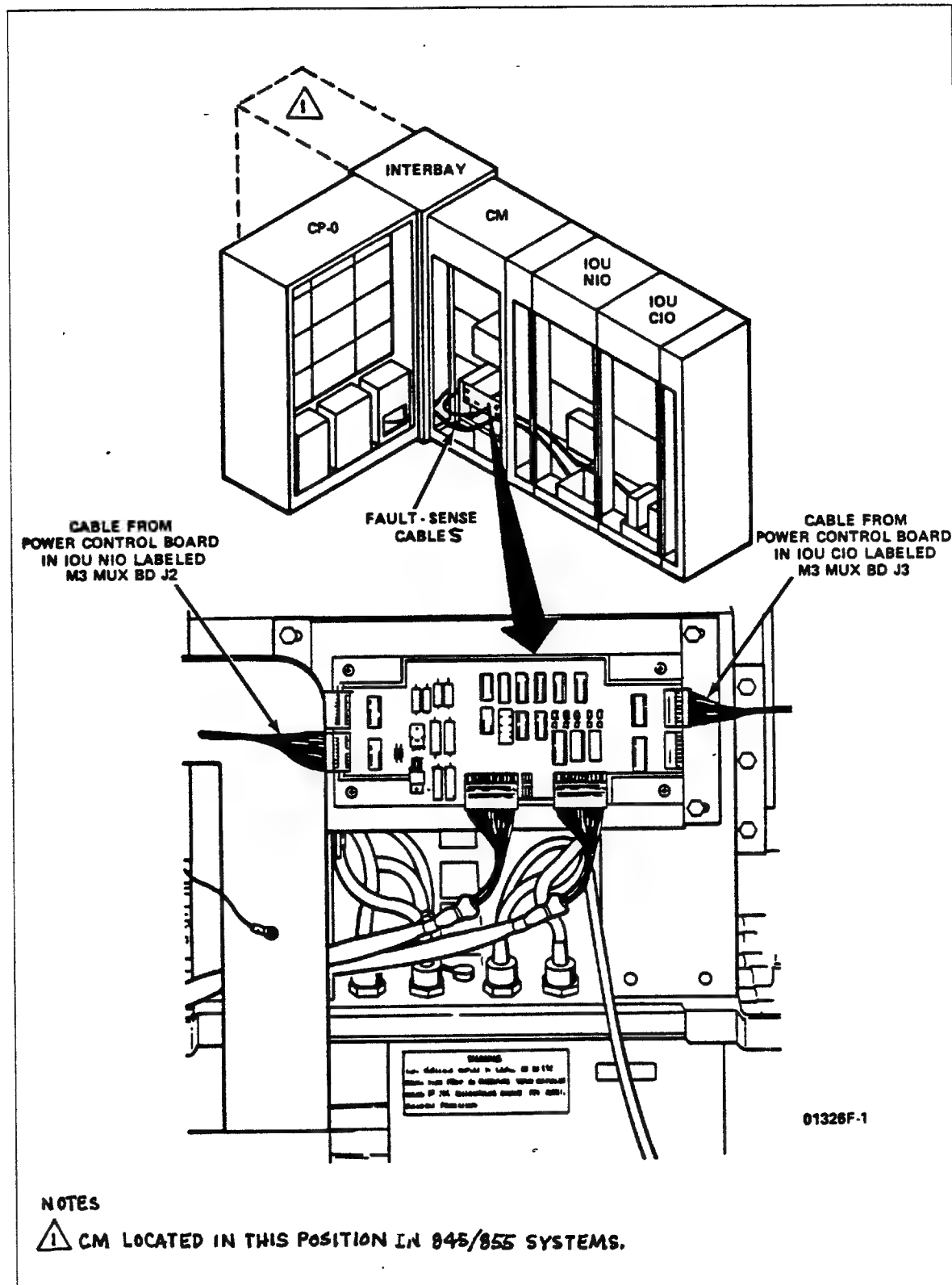


Figure 2-34. Fault-sense Cable Connections to BS213-A CM Multiplexer Board

Connect SPCP Status and Control Cables

Use this procedure to connect the status and control cables from the system power control panel (SPCP) to the newly installed optional equipment. Refer to figures 2-35, 2-36, and 2-37.

NOTE

DOES SYSTEM USE SPCP?

- If yes, continue.
- If no, go to next procedure.

Procedure prerequisites

- Bolting of the cabinets is complete

Tools/parts required

- Antistatic wrist strap

NOTE

IS CP-1 PRESENT?

- If yes, go to step 4.
- If no, continue.

Procedure

1. Reconnect three cable assemblies, P1, P2 and P4, removed from AB115-A IOU and reconnect to the new IOU. Reidentify and connect as shown in table 2-4.

Table 2-4. Status and Control Cable Connections

AB115-A IOU Connector Disconnected:	Reidentify Connector As:	NIO/CIO Connection:
P1 (from J8/BS213-A or J38/BS137-A CM)	P7	J7 (IOU NIO)
P2 (from J8 on SPCP)	P8	J8 (IOU CIO)
P4 (from J10 on SPCP)	P9	J9 (IOU CIO)



- 2. Provided IOU NIO and CIO cabinets were received bolted together, verify that the following cables are in place:

From	To
J8 (IOU NIO)	J7 of AT481-A IOU CIO
J9 (IOU NIO)	J10 of AT481-A IOU CIO
J13 (IOU NIO)	J14 of AT481-A IOU CIO

- 3. Connect the following cable assembly:

From	To
J13 (IOU CIO) (skip to step 7)	J2 (GH251-C WCU) (skip to step 7) J2

NOTE

IS CP-1 PRESENT?

- If yes, continue.
- If no, go to next procedure.

- 4. Connect cables to optional equipment in systems in which CP-1 is present, as follows:

AB115-A IOU Connector Disconnected:	Reidentify Connector As:	Connects To:
P1 (from J8 on CM)	P7	J7 of AT478-A IOU NIO
P2 (from J8 on SPCP)	P2 (same)	J2 of CP-1
P4 (from J10 on SPCP)	P9	J9 of AT478-A IOU CIO

- 5. Provided IOU NIO and CIO cabinets were received bolted together, verify that the following cables are in place:

From	To
J8 of AT478-A IOU NIO	J7 of AT481-A IOU CIO
J9 of AT478-A IOU NIO	J10 of AT481-A IOU CIO
J13 of AT478-A IOU NIO	J14 of AT481-A IOU CIO

- 6. Connect the following cable assemblies:

From	To
J8 of AT481-A IOU CIO	J1 of CP-1
J13 of AT481-A IOU CIO (see step 7)	J2 of GH251-C WCU (see step 7)
J14 of AT478-A IOU NIO	J4 of CP-1



- 7. To connect the J13 cable assembly from IOU CIO to J2 of WCU, route cable under raised floor (if not already done) and pull cable up through cable cutouts in floor and into bottom of water cooling unit.
- 8. Remove cover from interface assembly (applies only to GH251-A WCU). If cable assembly is connected to GH251-C, connector mates with connectors on open panel under transformer box. Make connections as listed in step 2.
- 9. Replace cover on interface assembly, if removed.

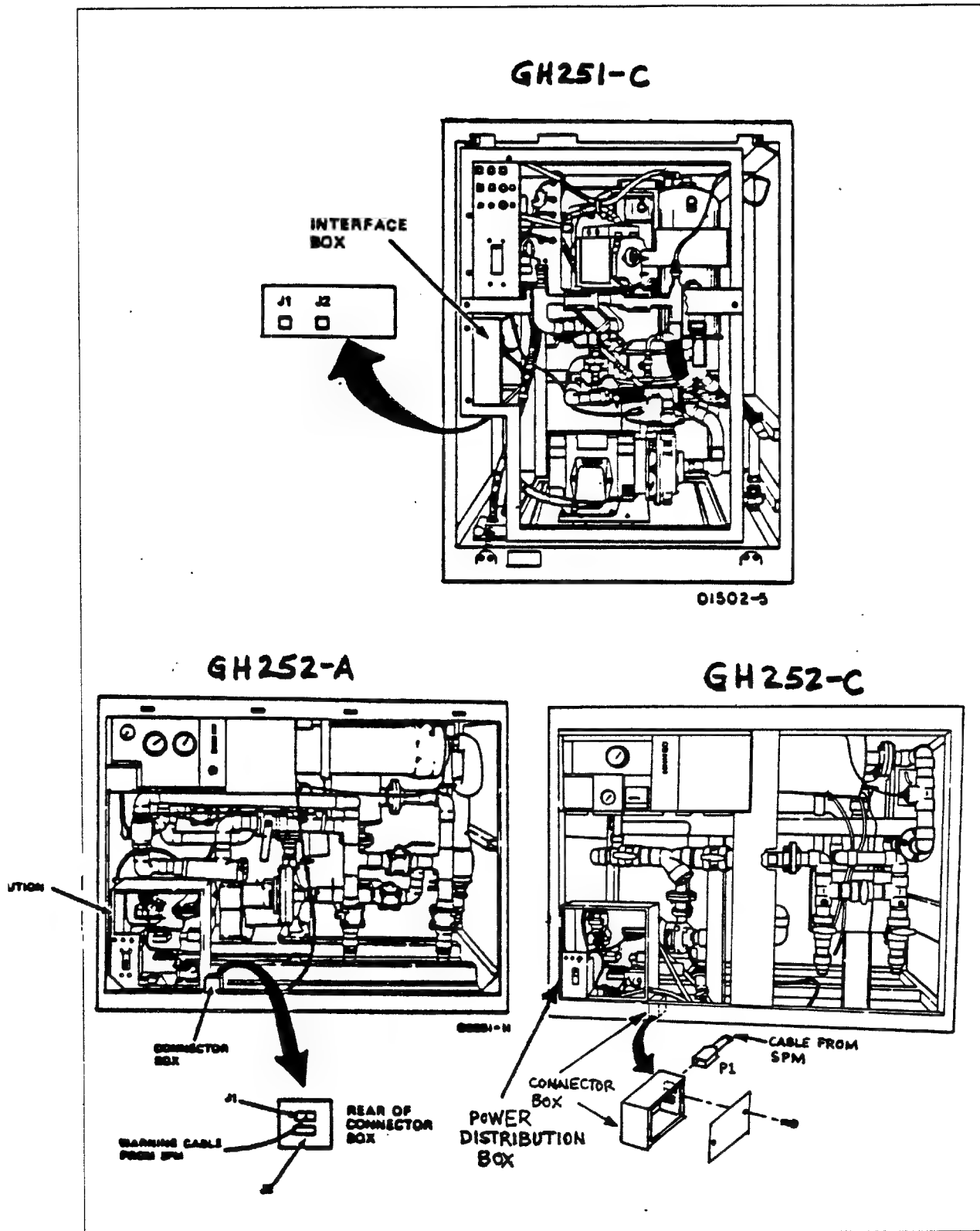


Figure 2-37. SPCP Cable Connections to Water Cooling Unit

Connect SPM Status and Control Cables

Use this procedure to connect the status and control cables from the system power monitor (SPM) to the water cooling unit. Refer to figure 2-38.

NOTE

DOES SYSTEM USE SPM?

- *If yes, continue.*
 - *If no, go to next procedure.*
-

Procedure prerequisites

- The status and control cables were connected to the SPM, labeled, and routed to the floor cutouts during preinstallation.

Tools/parts required

- Small, slotted screwdriver

NOTE

IS GH251-C WCU BEING CONNECTED TO SPM?

- *If yes, continue.*
 - *If no, go to next question.*
-

- ___ 1. Remove cover from interface box.
- ___ 2. Locate cable under raised floor from SPM J2. Remove floor tiles as necessary to locate cable.
- ___ 3. Pull cable up through cable cutouts in floor and into bottom of WCU.
- ___ 4. Connect warning cable J2 from SPM to J1 under interface assembly in WCU. Tighten screws that keep connector secured and in place.
- ___ 5. Install cover on interface assembly of WCU.
- ___ 6. Install floor tiles.

NOTE

IS GH252-A OR GH252-C WCU BEING CONNECTED TO SPM?

- *If yes, continue.*
 - *If no, go to next procedure.*
-

- ___ 7. Remove cover of small connector box next to power distribution box or behind the frame next to the power distribution box on WCU.

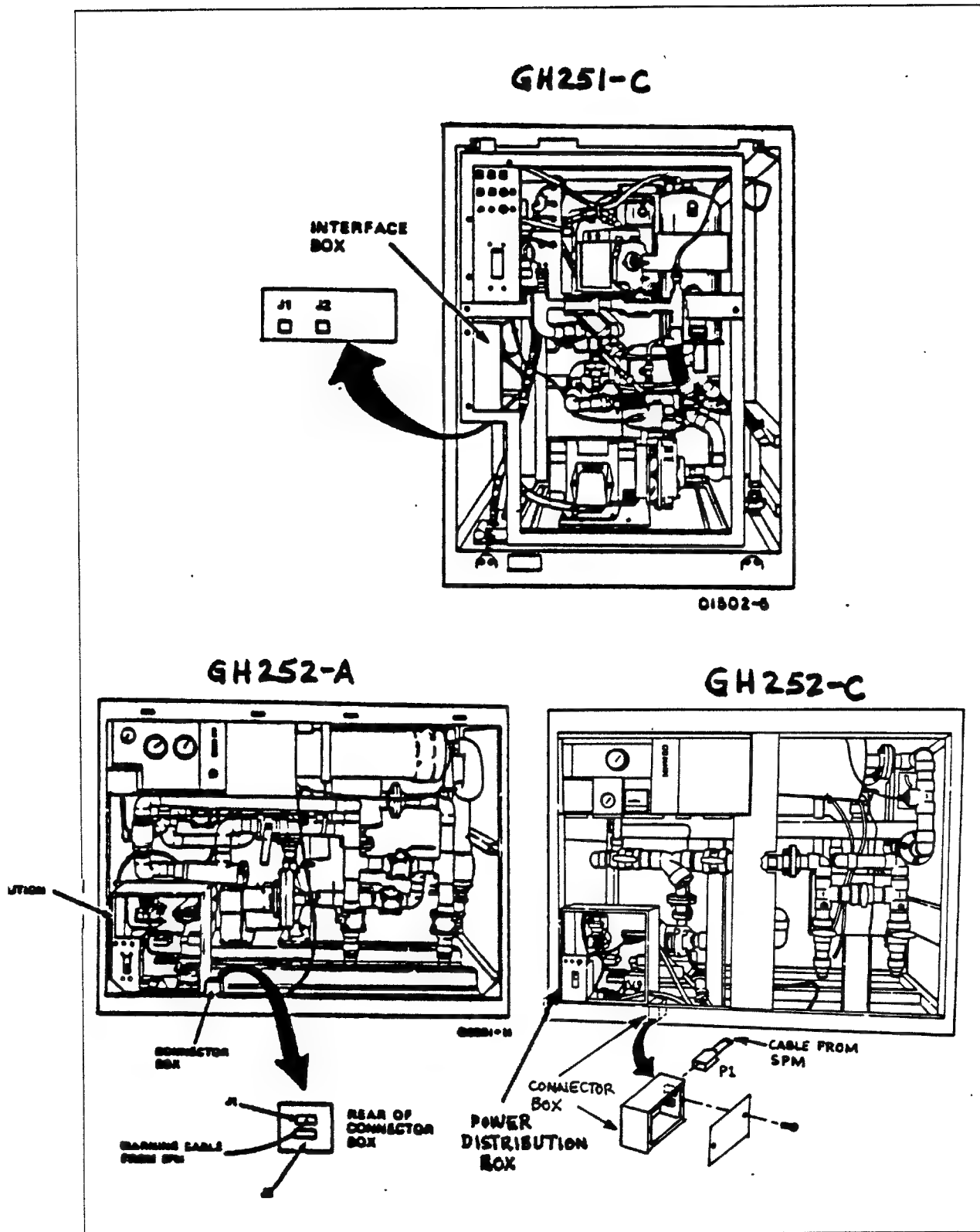


Figure 2-38. SPM Cable Connections to Water Cooling Unit

Connect SPM Status and Control Cables

- ___ 8. Locate cable under raised floor from SPM J2. Remove floor tiles as necessary to locate cable.
- ___ 9. Pull cable up through cable cutouts in floor and into bottom of WCU.
- ___ 10. Connect warning cable J2 from SPM to J1 inside small connector box and tighten screws that keep connector secured and in place.
- ___ 11. Install cover on connector box.
- ___ 12. Install floor tiles, if removed.

Power Installation

This section contains the procedures necessary to connect power to the primary IOU NIO and CIO.

Power installation prerequisites are:

- 50/60- and 400-Hz power are off.
- Power is available beneath raised floor.
- Preinstallation power inspection is complete and power wiring is correct.

Power installation includes the following tasks:

- Check Power-Off Conditions
- Connect Power to Primary IOU
 - Check Primary IOU Blower Motor Voltage Connections
 - Power-Plug Connections to Primary IOU
 - Connect IOU Power Cords to Interbay Power Panel
 - Terminal-Block Connections to Primary IOU

Tools/Parts required for the tasks include the following:

- Antistatic smock
- Phillips screwdriver
- Slotted screwdriver

CAUTION

Wear an antistatic smock throughout the installation to preven potential damage to microcircuits.

NOTE

Connections from an under-floor ground reference grid to EMC GND terminals in the following procedures are unnecessary with the normally-used shielded signal cables that go to and from the IOU and central computer. If a ground reference grid is present, it should be connected to the unit EMC GND terminals.. If any peripheral equipment connected to the IOU CIO has unshielded cables, all system components must connect to a ground reference grid. For additional information on this type grounding, refer to EMC Grounding in chapter 4 of the Site Preparation General Information manual.

Check Power-OFF Conditions

Use this procedure to ensure that all power to the primary IOU is off before making any power wiring connections.

WARNING

Power wiring to the primary IOU contains dangerous voltages that must be shut off before connecting the wiring to the primary IOU.

- 1. Check that wall-mounted 50/60-Hz circuit breakers that supply power to primary IOU and to system power monitor are set to OFF.
- 2. Check that wall-mounted 400-Hz circuit breakers for primary IOU are set to OFF.
- 3. Check that main disconnect circuit breakers on primary IOU are set to OFF. These circuit breakers are on fronts of power distribution boxes.
- 4. Check that power switch on mux power supply in IOU NIO section is set to OFF. Switch is located about mid-way on end panel of mux power supply in primary IOU NIO section of cabinet.

Connect Power to Primary IOU

Power wiring connections to the primary IOU include 50/60-Hz, single-phase, 120-V utility power and 400-Hz, 3-phase, 120/208-V M-G power. The following procedures describe these connections.

Use the first of the following four procedures to ensure that the wiring connections on the primary IOU blower motor transformer conform to site power.

Use the second or fourth procedure to connect 50/60-Hz, single-phase, 120-V power and 400-Hz, three-phase, 120/208-V power to both the NIO and the CIO sections of the primary IOU. Follow the procedure that corresponds to the preinstallation preparations for either power-plug or terminal-block power connections.

- Check Primary IOU Blower Motor Voltage Connections
- Power-Plug Connections to Primary IOU
- Connect IOU Power Cords to Interbay Power Panel
- Terminal-Block Connections to Primary IOU

Check Primary Blower Motor Voltage Connections

Use this procedure to ensure that the NIO and CIO cabinet blower motor wiring corresponds to the available site voltage. Refer to figures 2-39, 2-40, and 2-41.

Procedure prerequisites

- 50/60- and 400-Hz power to both IOU cabinets is off

Tools/parts required

- Slotted screwdriver
- Phillips screwdriver

Procedure

- 1. Identify site voltage as one of the following:
 - 60-Hz, 3 phase, 120/208-V
 - 50-Hz, 3 phase, 220/380-V
 - 50-Hz, 3 phase, 240/415-V.
- 2. Verify that labels on IOU NIO and CIO cabinets indicate that cabinet is wired for available site voltage.

NOTE

IS CABINET WIRED FOR SITE VOLTAGE?

- *If yes, go to step 10.*
 - *If no, go to step 3.*
-

- 3. Verify power-off conditions as follows:
 - a. Verify that all circuit breakers on interbay power panel are set to OFF.
 - b. Verify that MAIN DISCONNECT circuit breaker on IOU NIO power distribution box is set to OFF.
- 4. Remove retaining screw and lockwasher that secures L bracket to frame at front lower left corner of hinged power distribution box of IOU NIO. This may have been done in a previous procedure.
- 5. Swing power distribution box outward from cabinet.
- 6. Remove rear ventilated cover from power distribution box.
- 7. Remove terminal strip cover from transformer T5, located at rear top center of power distribution box.

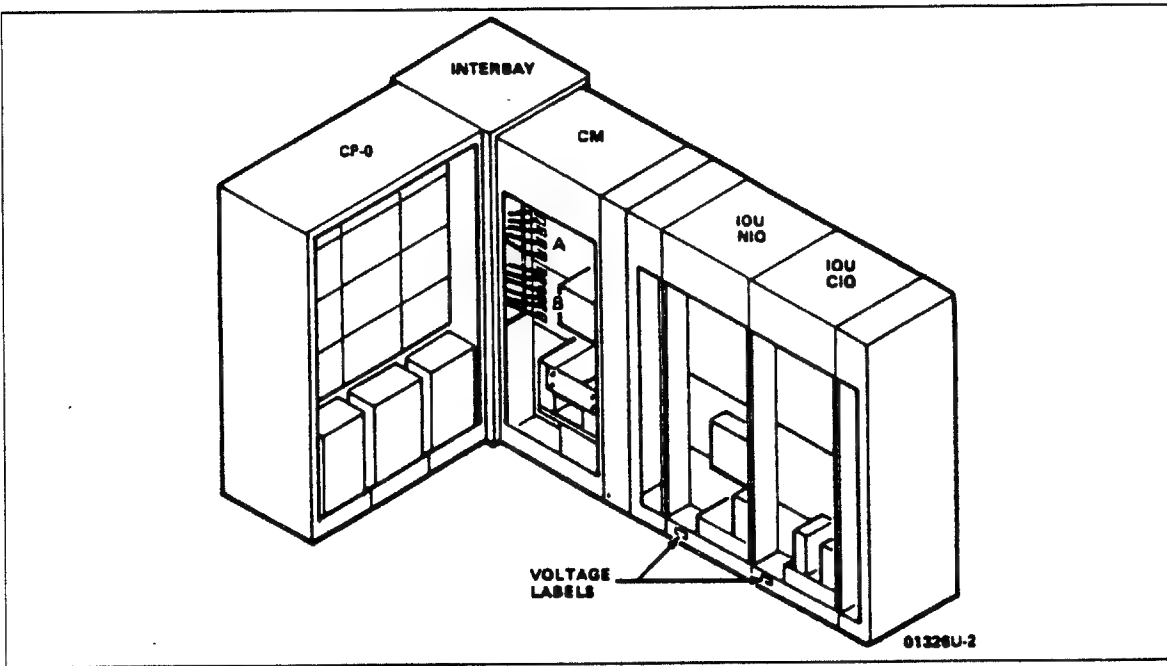


Figure 2-39. Voltage Label Locations

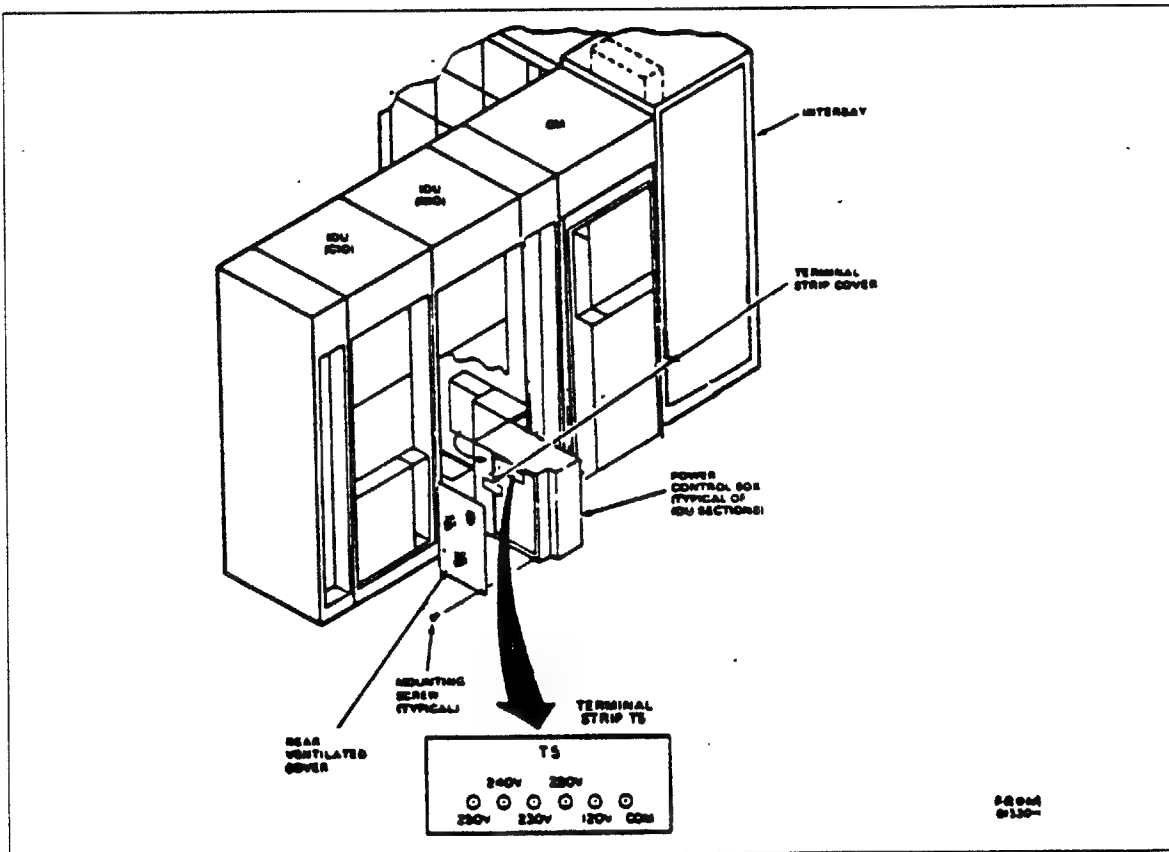


Figure 2-40. Changing IOU Blower Wiring Connections

To present the information in this chapter in a structured format, this page has been left blank.

- 8. Observe that one wire connects to COM terminal, and a second wire to 120-V terminal. Proceed with the third wire (if present) as follows:
 - If third wire (labeled RECONNECTABLE) is already connected to terminal that matches site voltage, go to step 9.
 - If third wire is not connected to corresponding site voltage, connect it to proper site voltage terminal. Also, if wire is not labeled RECONNECTABLE, do it now.
- 9. Install terminal strip cover on T5.
- 10. Repeat this procedure for IOU CIO cabinet.

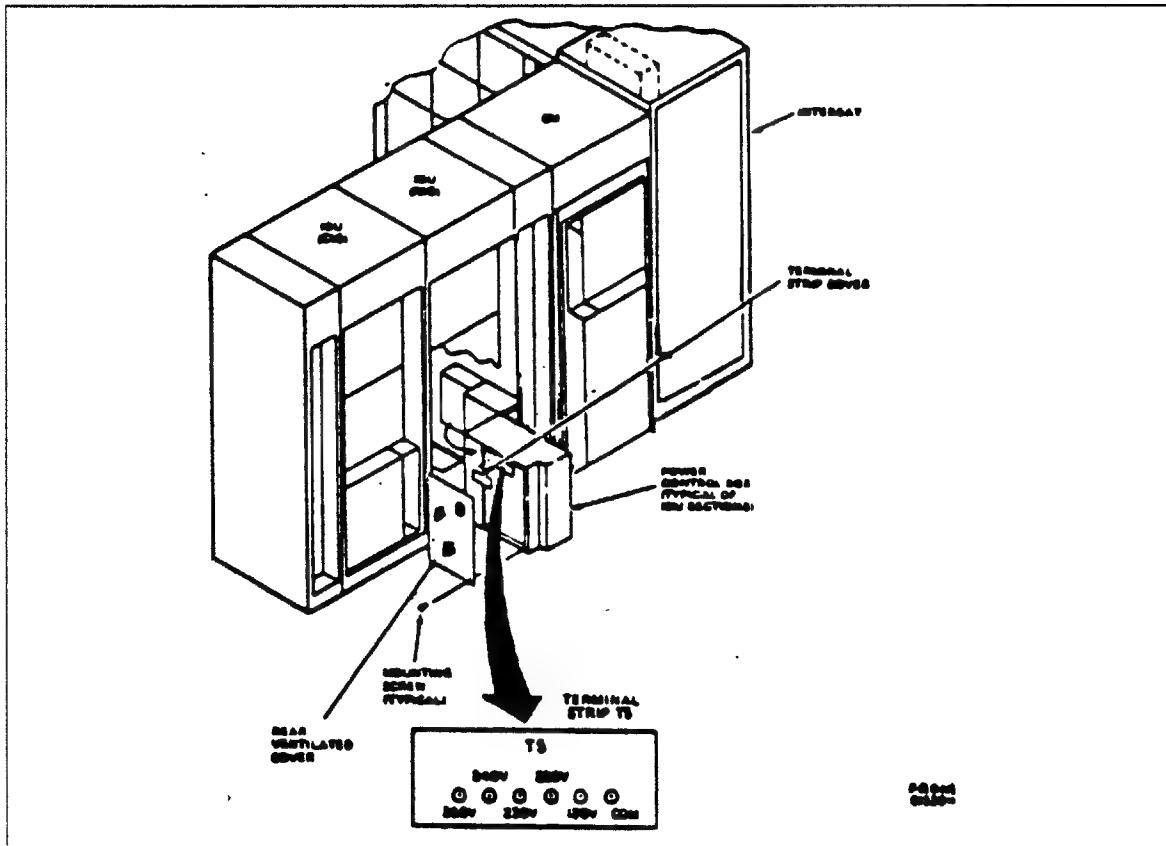


Figure 2-41. Rewiring IOU Cabinets

Power-Plug Connections to Primary IOU

Use this procedure when the site preinstalled 50/60- and 400-Hz power wiring has pluggable connectors for connection with primary IOU power cord connectors. The procedure covers one section of the primary IOU and must be repeated for the second section. Refer to figure 2-42.

Procedure prerequisites

- 50/60-Hz power is off.
- 400-Hz power is off.
- Preinstallation wiring is complete and power wiring is correct.

Tools and parts required

- Phillips screwdriver
- One 2-m (6 ft), 50/60-Hz, 3-phase, power cord for NIO section
- One 2-m (6 ft), 50/60-Hz, 3-phase, power cord for CIO section
- One 2-m (6 ft), 400-Hz, 3-phase, power cord for NIO section
- One 2-m (6 ft), 400-Hz, 3-phase, power cord for CIO section

Procedure

- 1. Remove retaining screw and lockwasher from left front corner of power distribution box in NIO section. This may have been done in a previous procedure.
- 2. Swing power distribution box outward from section to permit access to power input box.
- 3. Reinstall retaining screw and lockwasher for storage and later use, if not previously done.
- 4. Remove cover from power input box. Cover has four screws.
- 5. Remove floor tiles, as necessary, to place 50/60- and 400-Hz power cords under raised floor in front of power supply.
- 6. Remove retaining ring from strain relief on 400-Hz power cord.
- 7. Pull 400-Hz power cord connector up through cutout in power input box, install retaining ring on strain relief, and connect cord to J2.
- 8. Attach green ground wire to safety ground terminal E3.
- 9. Remove retaining ring from strain relief on 50/60-Hz power cord.
- 10. Pull 50/60-Hz power cord connector up through cutout in power input box, install retaining ring on strain relief, and connect cord to J1.

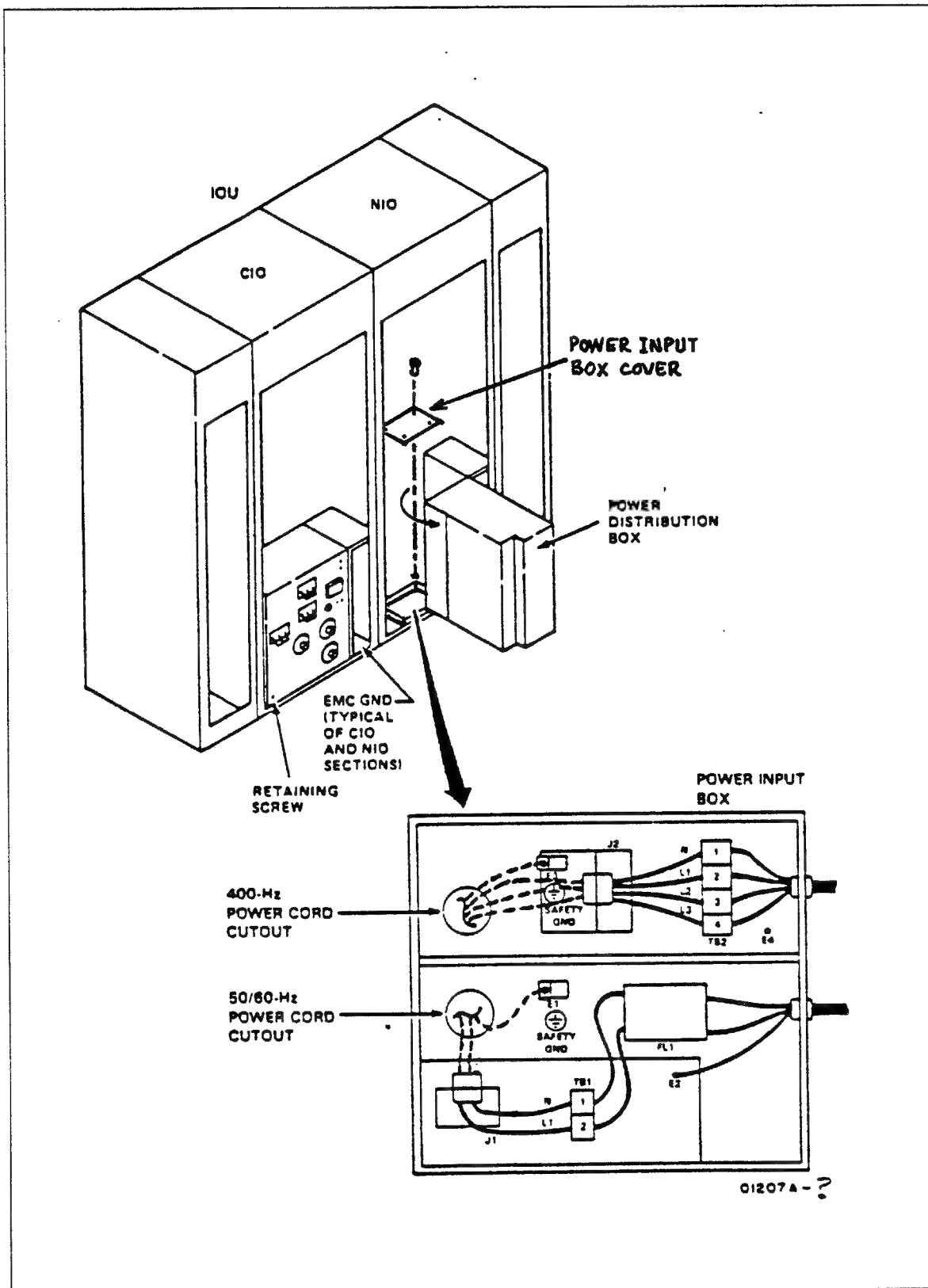


Figure 2-42. Primary IOU 50/60- and 400-Hz Power Plug Connections

To present the information in this chapter in a structured format, this page has been left blank.

- ___ 11. Connect braided ground strap from EMC GND terminal to customer-provided terminal on raised-floor grid. (This connection is optional. Refer to note at beginning of power connection procedures.) If braided ground strap is not used but is connected to EMC GND terminal, disconnect strap from terminal and store it at site.
- ___ 12. Attach green ground wire to safety ground terminal E1.
- ___ 13. Connect 50/60- and 400-Hz power cord connectors under raised floor to site power connectors.
- ___ 14. Install cover on power input box.
- ___ 15. Swing power distribution box into section. Do not fasten with retaining screw at this time.
- ___ 16. Repeat procedure with CIO section.
- ___ 17. Install floor tiles if water hose connections to primary IOU are complete.

Connect IOU Power Cords to Interbay Power Panel

Use this procedure to route the IOU NIO and CIO power cords through cabinets and to mate connectors with interbay power panel connectors. Refer to figure 2-43, 2-44, and 2-45. This procedure does not apply to 855 systems not having an interbay cabinet.

Procedure prerequisites

- 50/60- and 400-Hz power is off
- Cabinet bolting procedures complete

Tools/parts required

- Slotted screwdriver
- Torx screwdriver
- 3/8-in drive socket wrench set

NOTE

ARE IOU NIO AND CIO LARGE YELLOW POWER CORDS PRECONNECTED AND COILED IN BOTTOM OF CABINETS?

- *If yes, go to next question.*
 - *If no, perform steps 1 through 6.*
-

Procedure

- 1. Remove power cords from plastic bag and position white nylon connectors in bottom of CIO cabinet for connection to mating connectors.
- 2. Remove screws and flat washers that secure plastic wiring guard (bottom of cabinet, left of large blue bus bar) to IOU cabinet panel. Use Torx screwdriver or appropriate size socket wrench to remove screws.
- 3. Disconnect P20 from J20 and disconnect P21 from J21. Since P20 and P21 will not be of further use, place them on the bottom of the IOU CIO cabinet.
- 4. Mate power cord P20 with J20 and power cord P21 with J21 in area near bottom of IOU CIO cabinet from which wiring guard was removed.
- 5. Remove cable clamps from frame member, insert cables into clamps and tighten screws to secure yellow cables to frame member.
- 6. Attach green safety ground wires to safety ground lug between P20 and P21.
- 7. Install plastic wiring guard over P20/J20 and P21/J21 with screws and flatwashers removed in step 2.
- 8. Repeat steps 1 through 7 for the IOU NIO cabinet.

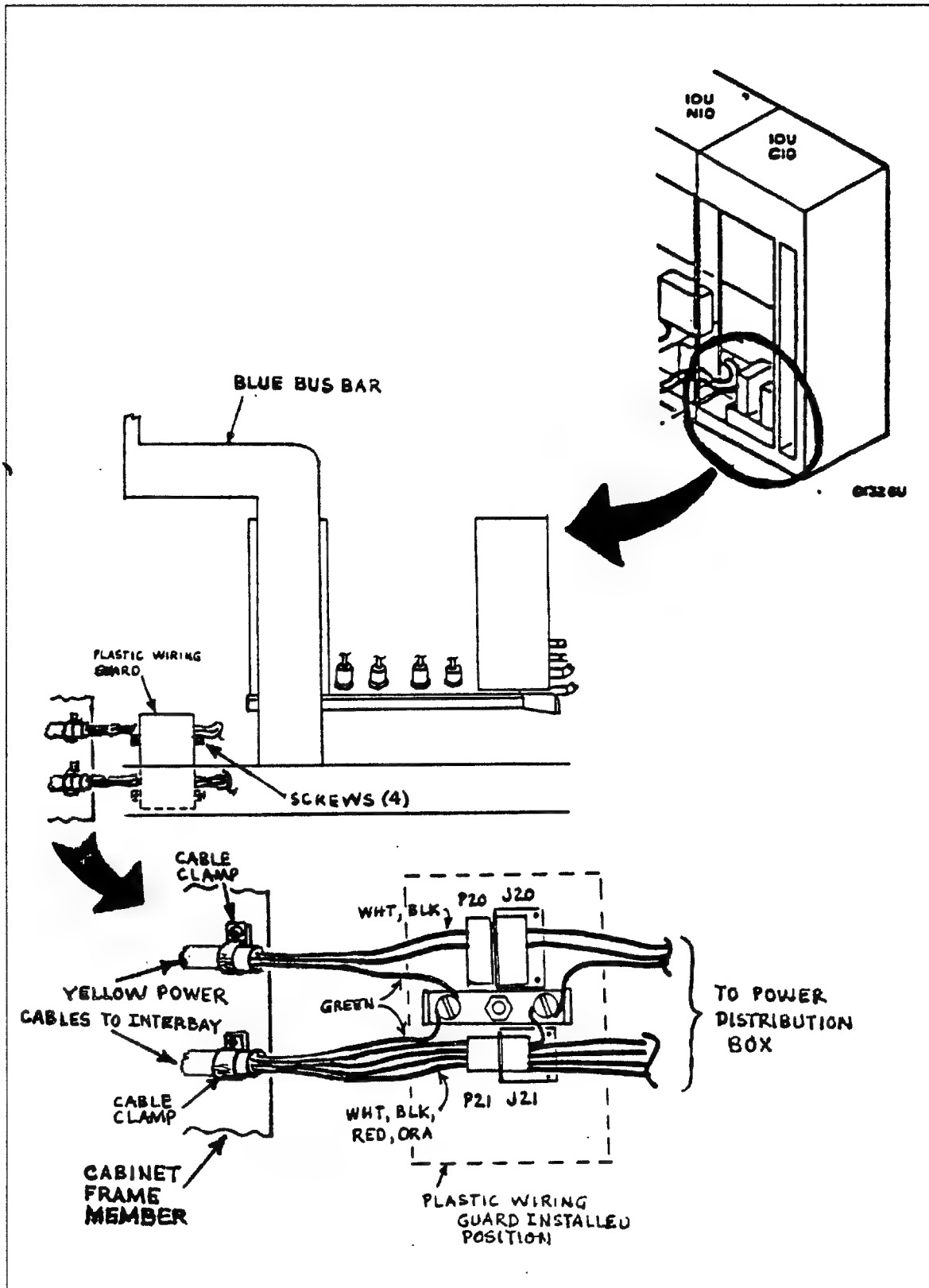


Figure 2-43. Connecting IOU Power Cords to J20 and J21

NOTE

IS BS213-A CM IN SYSTEM?

- *If yes, continue.*
 - *If no, go to next question.*
-

- ___ 9. Remove CM and IOU NIO cover plates at bottom of cabinets. Each plate has three screws (see figure).
- ___ 10. Uncoil IOU NIO power cords and route them through lower area of CM and into interbay cabinet.
- ___ 11. Mate appropriate connectors with J1 (50/60-Hz) and J9 (400-Hz) on interbay power panel.
- ___ 12. Twist connectors about 1/8th turn clockwise to lock them in place.
- ___ 13. Uncoil IOU CIO power cords and route them through bottoms of IOU NIO and CM cabinets and into interbay cabinet.
- ___ 14. Mate appropriate connectors with J2 (50/60-Hz) and J14 (400-Hz) on interbay power panel.
- ___ 15. Twist connectors about 1/8th turn clockwise to lock them in place.
- ___ 16. Coil excess power cord in bottom of each IOU cabinet.
- ___ 17. Replace cover plates taking care not to pinch any of power cords.

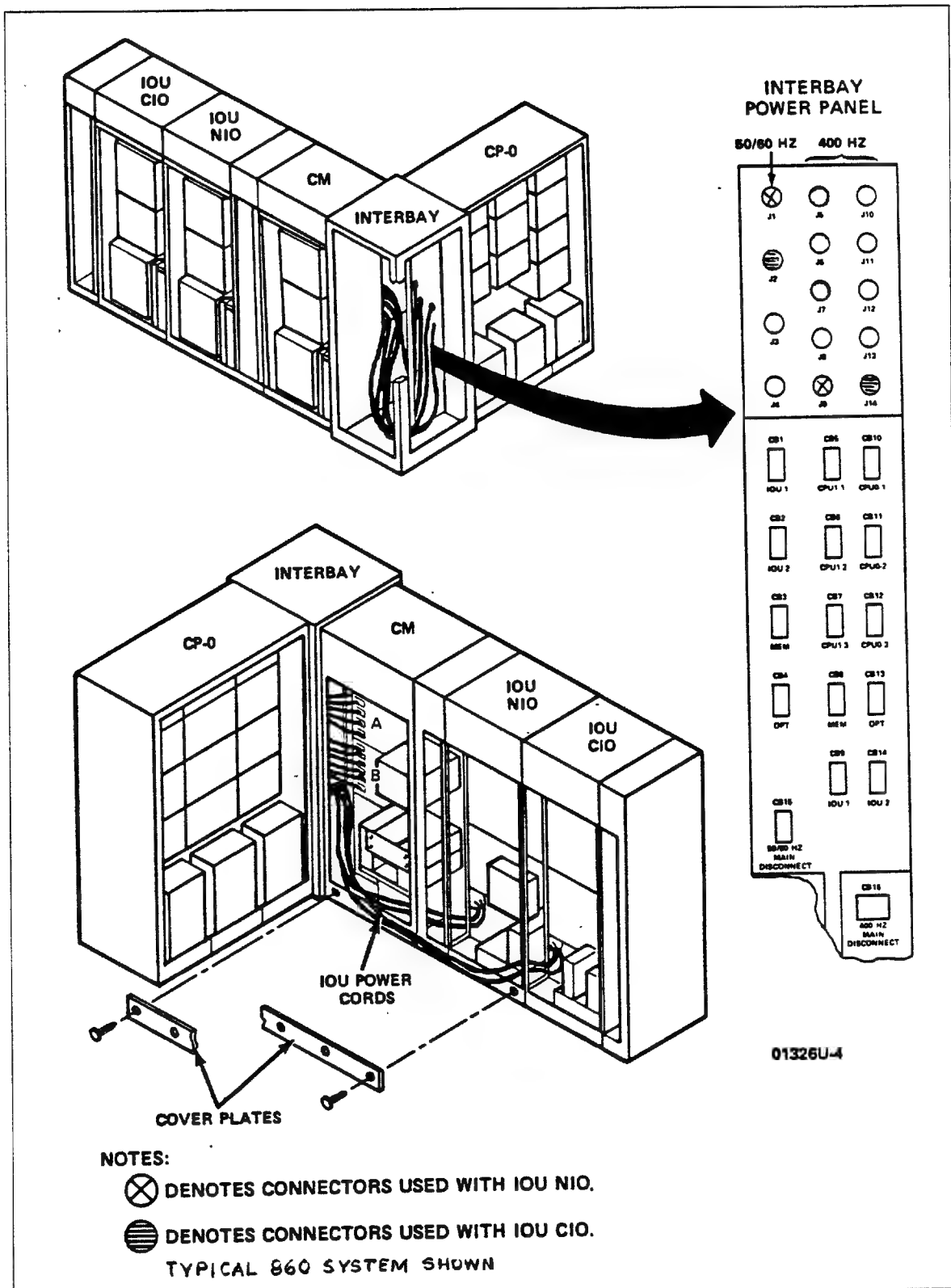


Figure 2-44. Routing/Connecting IOU Power Cords to Interbay via BS213-A CM

NOTE

IS BS137-A CM IN SYSTEM?

- *If yes, continue.*
 - *If no, go to next procedure.*
-

- ___ 18. Remove IOU NIO cover plate at bottom of cabinet.
- ___ 19. Uncoil IOU NIO power cords and route them through the cable opening into the interbay cabinet.
- ___ 20. Mate appropriate connectors with J1 and J9 on interbay power panel.
- ___ 21. Twist connectors about 1/8th turn clockwise to lock them in place.
- ___ 22. Uncoil IOU CIO power cords and route them through the bottom of the IOU NIO cabinet into interbay cabinet.
- ___ 23. Mate appropriate connectors with J2 (50/60-Hz) and J14 (400-Hz) on interbay panel.
- ___ 24. Twist connectors about 1/8th turn clockwise to lock them in place.
- ___ 25. Coil excess power cord in bottom of each IOU cabinet.
- ___ 26. Replace cover plate taking care not to pinch any power cord.

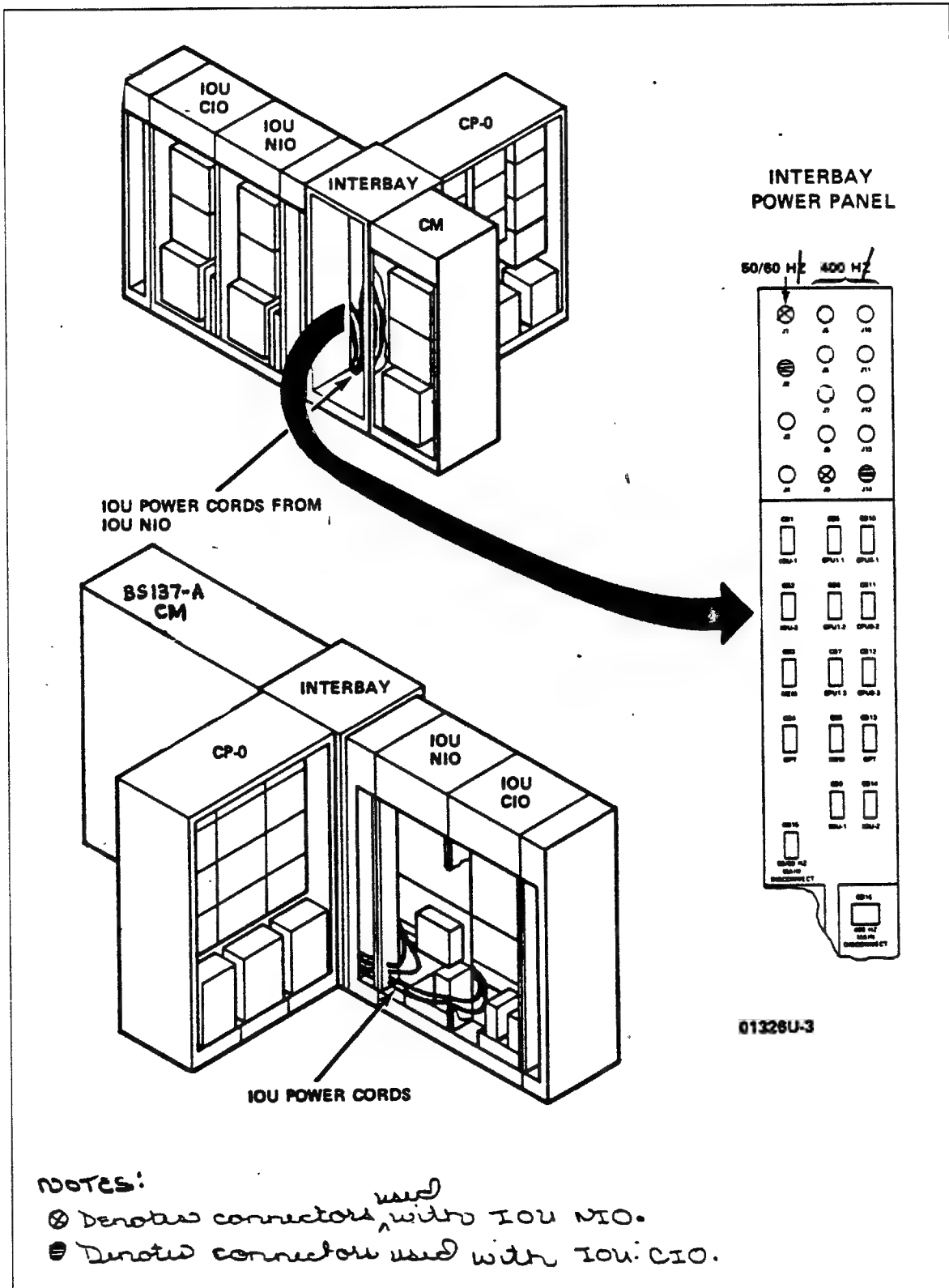


Figure 2-45. Routing/Connecting IOU Power Cords to Interbay - 845/855 Systems

Terminal-Block Connections to Primary IOU

Use this procedure when the site preinstalled 50/60- and 400-Hz power wiring has wires that will connect directly to terminal blocks in the primary IOU. This procedure covers the NIO section of the primary IOU and must be repeated for the CIO section. Refer to figures 2-46 and 2-47.

Procedure prerequisites

- 50/60-Hz power is off.
- 400-Hz power is off.
- Preinstallation power inspection is complete and power wiring is correct.

Tools required

- Phillips screwdriver
- Slotted screwdriver

Procedure

NOTE

A licensed electrician must connect the power wiring under the supervision of a Control Data customer engineer and follow all local codes.

- 1. Remove retaining screw and lockwasher from left front corner of power distribution box in NIO section. This may have been done in a previous procedure.
- 2. Swing power distribution box outward from section to access power input box.
- 3. Reinstall retaining screw for storage and later use, if not previously done.
- 4. Remove cover from power input box. Cover has four screws.
- 5. Cut wires from connectors J1 and J2 in power input box.
- 6. Loosen terminals on TB1 and TB2 and remove cut wires only. Do not remove any other wires.

NOTE

Do not remove power connectors J1 and J2 from their brackets.

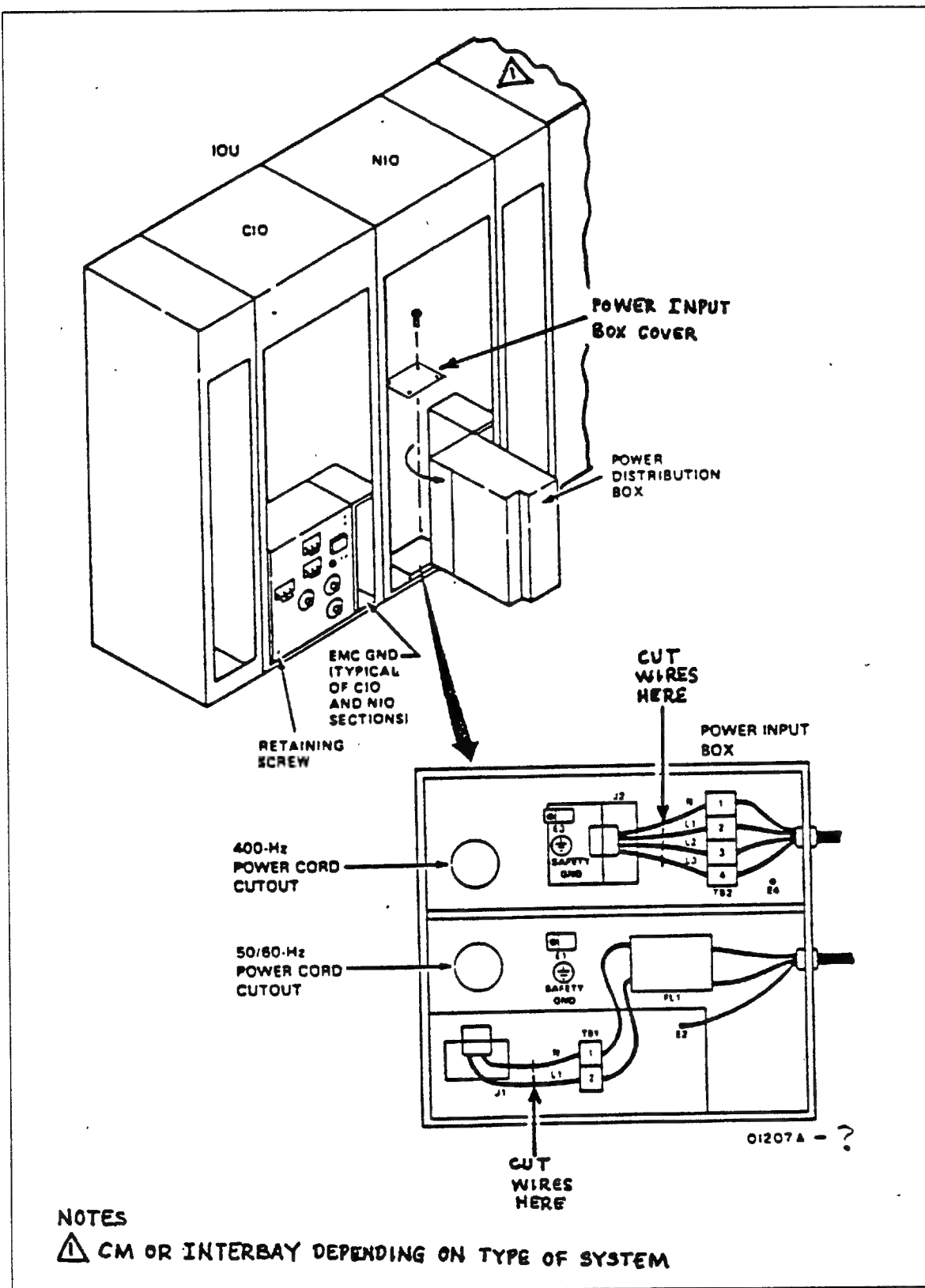


Figure 2-46. Terminal Block Power Connections to Primary IOU

- ___ 7. Remove floor tiles in front of IOU NIO power distribution box.
- ___ 8. Remove retaining ring from strain relief on preinstalled 400-Hz power wires.
- ___ 9. Pull power wires up through cutout into power input box to TB2.
- ___ 10. Install retaining ring on strain relief for wires pulled up in step 9.
- ___ 11. Remove retaining ring from strain relief on preinstalled 50/60-Hz power wires.
- ___ 12. Pull power wires up through cutout in power input box to TB1.
- ___ 13. Install retaining ring on strain relief for wires pulled up in step 13.
- ___ 14. Connect 400-Hz wires to TB2 as follows:
 - White to TB2-1
 - Black to TB2-2
 - Red to TB2-3
 - Orange to TB2-4
- ___ 15. Connect 400-Hz safety ground wire to E3.
- ___ 16. Connect 50/60-Hz wires to TB1.
 - White to TB1-1
 - Black to TB1-2
- ___ 17. Connect braided ground strap from EMC GND terminal to customer-provided terminal on raised-floor grid. (This connection is optional. Refer to note at beginning of power connection procedures.) If braided ground strap is not used but is connected to EMC GND terminal, disconnect strap from terminal and store it at site.
- ___ 18. Connect 50/60-Hz safety ground wire to E1.
- ___ 19. Install cover on power input box.
- ___ 20. Swing power distribution box into NIO section. Do not fasten with retaining screw at this time.
- ___ 21. Repeat this procedure for CIO section.
- ___ 22. Install floor tiles if water hose connections to primary IOU are complete.

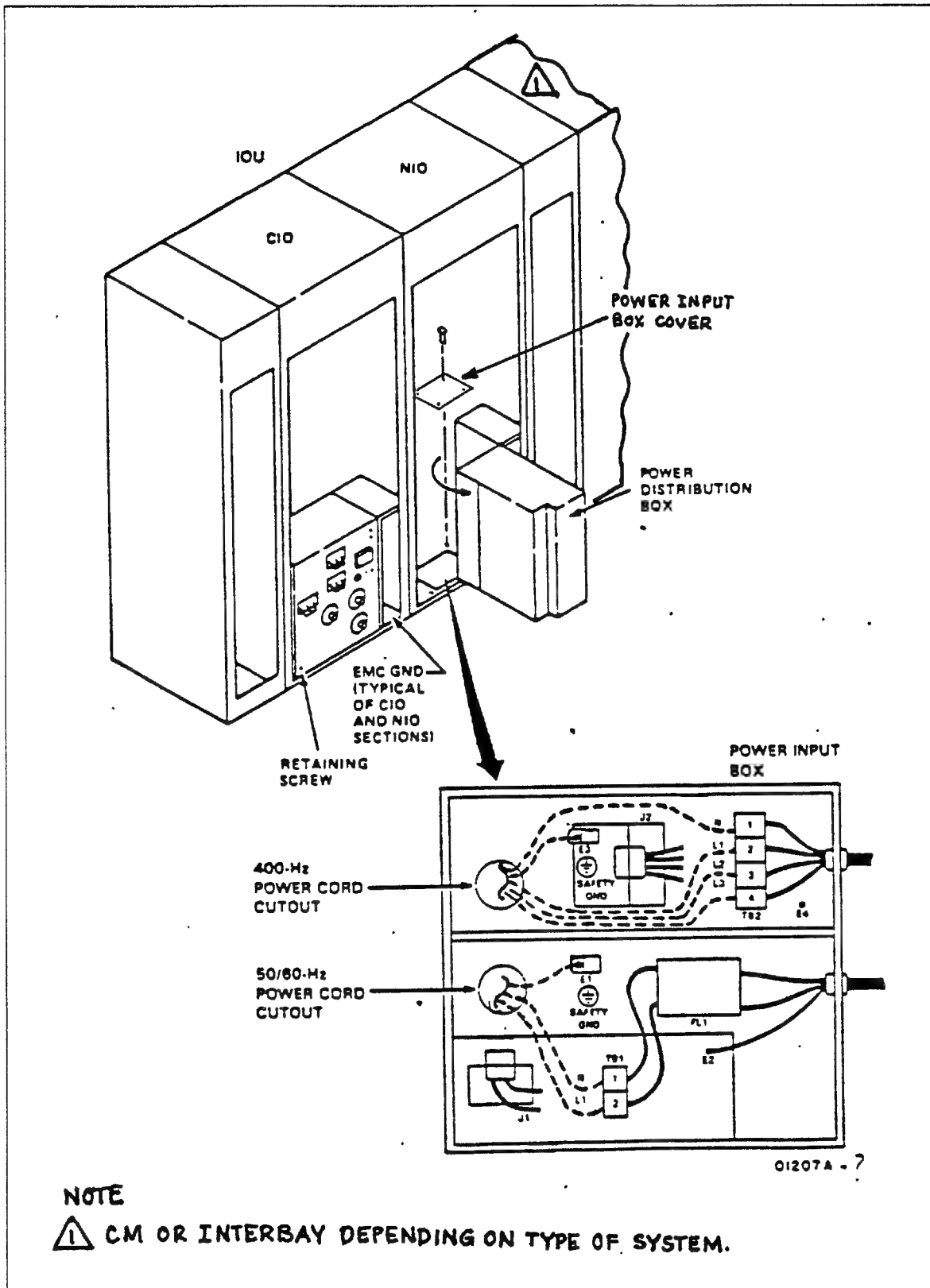


Figure 2-47. Terminal Block Power Connections to Primary IOU

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Adapt the IOU

Adapting the IOU to the system in which it is to operate consists of connecting it to the maintenance channel and verifying system power configurations and switch positions. The tasks are:

- Verify or Change Cabinet Switches

Verify or Change Cabinet Switches

Use this procedure to verify and change, if necessary, the SYSTEM EMERGENCY switch and the dip switches on the mux board at the rear of each of the CM, CP-0, and CP-1 (if present) cabinets. Refer to figure 2-48.

Tools/parts required

- Phillips screwdriver

Procedure

NOTE

The SPM or SPCP will not operate unless SYSTEM EMERGENCY switch is set to ON.

- ___ 1. Set interbay switches as follows:
 - ___ a. Set SYSTEM EMERGENCY to ON
 - ___ b. Set circuit breakers CB1 through CB16 to OFF

NOTE

The dip switches have two positions (0 and 1). Only the 0 positions are identified on the switches.

- ___ 2. Verify dip switch settings at rear of CM cabinet are correctly positioned by observing that A5 slide is at 1 (left) and A6, A7, and CHILLER slides are at 0 (right). If slides are incorrectly set, reset them.
- ___ 3. Verify dip switch setting at rear of CP-0 column 1 as follows:
 - ___ a. Remove two screws from multiplexer board cover and remove cover.
 - ___ b. Observe that the A5, A6, A7, and CHILLER slides on multiplexer board dip switch are at 0 (right). Reset if necessary.
 - ___ c. Reinstall multiplexer board cover.
- ___ 4. Repeat step 3 for columns 2 and 3 of CP-0.

NOTE

IS CP-1 PRESENT?

- *If yes, continue.*
 - *If no, go to next procedure.*
-

- ___ 5. Verify dip switch settings at rear of CP-1 column 1 as follows:
 - ___ a. Remove two screws to remove multiplexer board cover and remove cover.
 - ___ b. Observe that A6 slide is at 1 (left) and A5 and A7 slides are at 0 (right). Reset if necessary.
 - ___ c. Observe that CHILLER slide is at 1 (left) when CP-1 cooling is from a second WCU. When CP-1 cooling is from the same WCU as CP-0, set chiller slide to 0 (right).
 - ___ d. Reinstall multiplexer board cover.
- ___ 6. Repeat step 5 for columns 2 and 3 of CP-1.

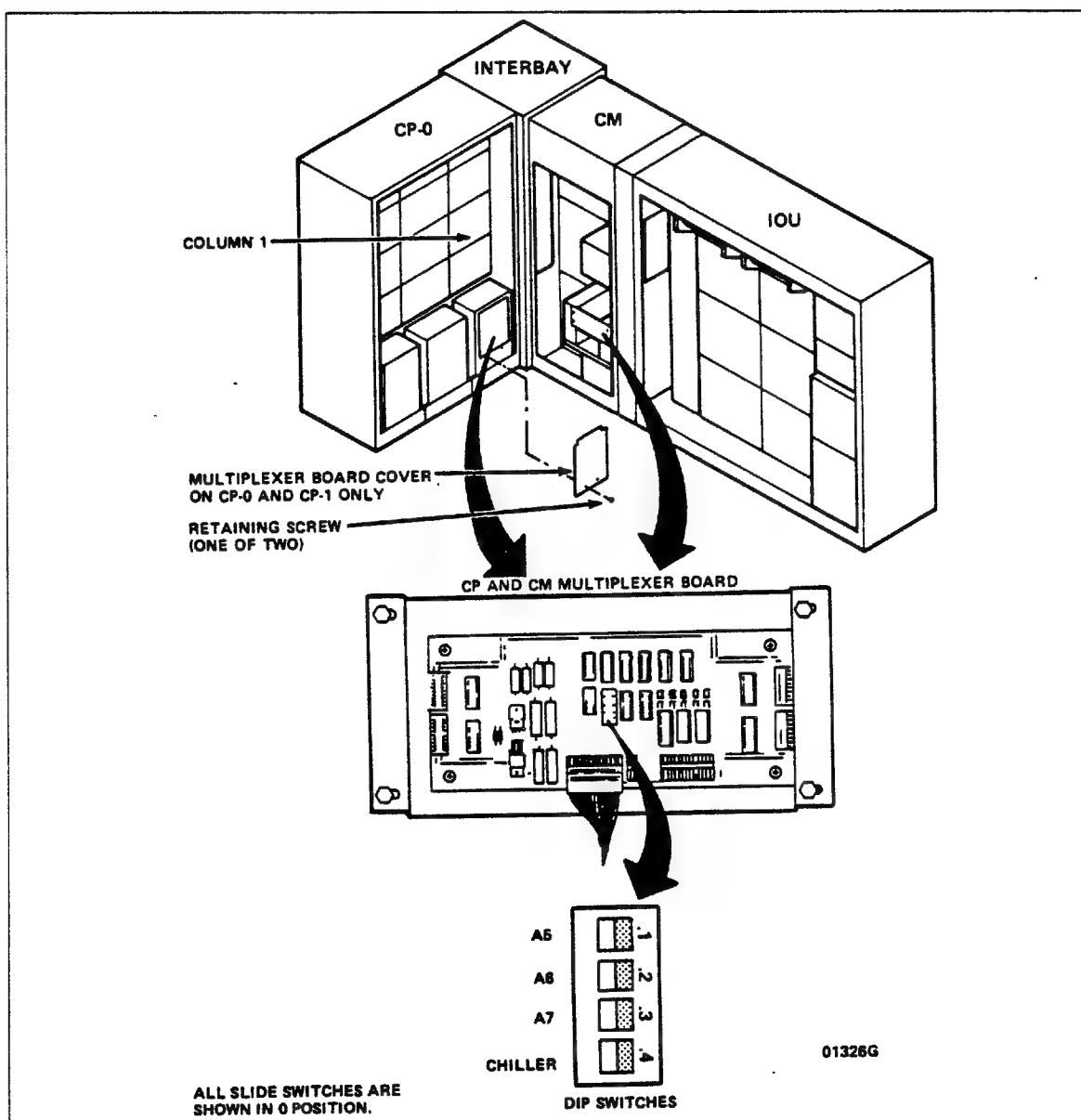


Figure 2-48. Multiplexer Board DIP Switches in CP and CM Cabinets

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Apply System Power

Applying system power consists of starting the M-G set and water cooling unit(s) from the SPM or SPCP, turning on power to the CP, CM, and IOU cabinets, and adjusting cabinet voltages as described in the following procedures:

WARNING

In case of a personnel or equipment emergency, press the SYSTEM EMERGENCY switch on the front of the interbay cabinet to remove system power.

- Apply M-G set power From SPCP (845/855 Systems Only)..
- Apply M-G Set Power From SPM
- Apply Power and Adjust Voltages for IOU NIO Cabinet.
- Apply Power and Adjust Voltages for IOU CIO Cabinet.
- Check Water Flow Rates.

NOTE

Set all LOCAL/REMOTE switches on the various power distribution boxes, etc. to the REMOTE positions before applying system power.

Apply System Power

To present the information in this chapter in a structured format, this page has been left blank.

Apply M-G Set Power From SPCP (845/855 Systems Only)

Use the following procedure to apply 400-Hz power to the M-G set from the SPCP. Refer to figure 2-49.

Procedure prerequisites

- Water cooling unit must be operating.
- M-G set power was previously checked out and run in the local mode of operation. M-G set is set for remote operation.
- M-G set output voltages were previously adjusted.
- All wall-mounted disconnect boxes that control power from the M-G set to the computer system are set to OFF.

Procedure

- 1. Set 400-Hz wall-mounted circuit breaker for SPCP to ON.
- 2. Press and release REMOTE ENABLE/LOCAL START switch on front of SPCP. M-G set starts; POWER ON indicator on front of SPCP lights.
- 3. Allow M-G set to operate until percentage meter on SPCP stabilizes at 0 percent.

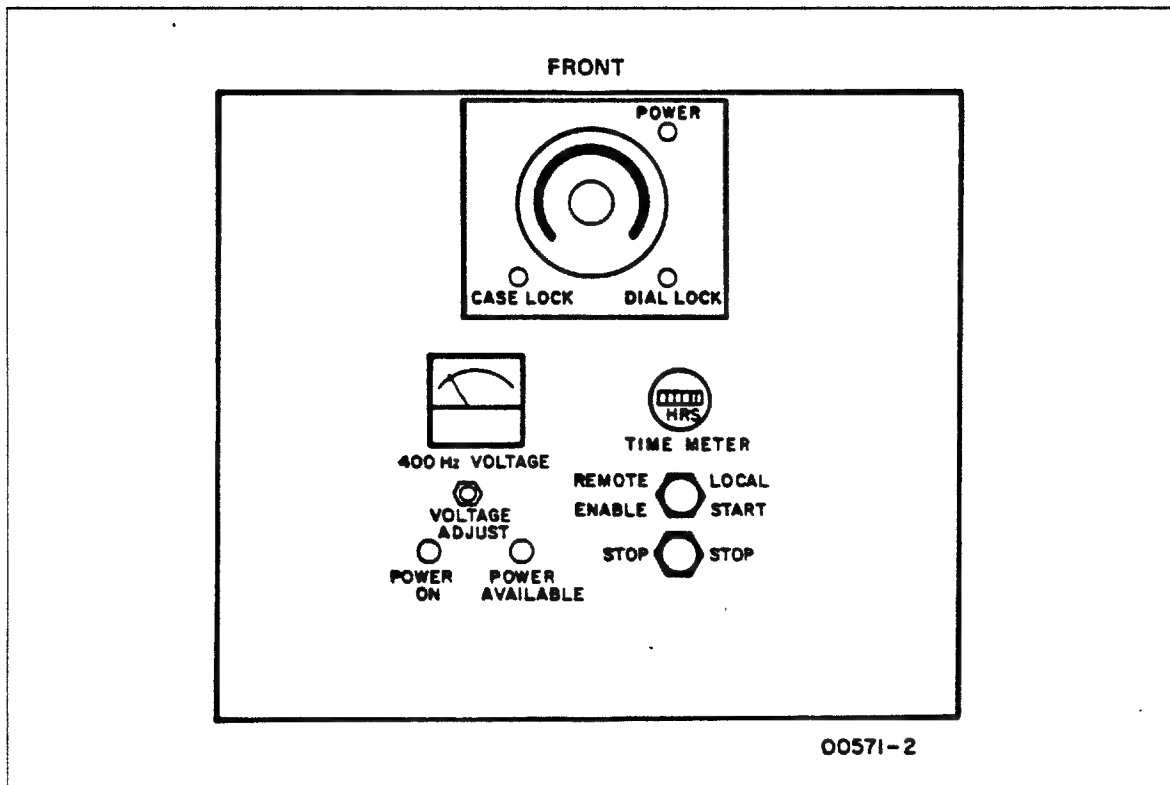


Figure 2-49. Applying M-G Set Power From SPCP

Apply M-G Set Power From SPM

Use this procedure to start the M-G set power from the controls on the system power monitor (SPM). Refer to figures 2-50 and 2-51.

NOTE

DOES SYSTEM USE AN SPM?

- *If yes, continue.*
 - *If no, go to next procedure.*
-

Procedure prerequisites

- Water cooling unit must be operating.
- M-G set power was previously checked out and run in the local mode of operation. M-G set is set for remote operation.
- M-G set output voltages were previously adjusted.
- All wall-mounted disconnect boxes that control power from the M-G set to the computer system are set to OFF.
- Switch groups SN1, SN2, and SN3 in the SPM were set to system conditions during preinstallation procedures.

Tools/parts required

- Slotted screwdriver

Procedure

- 1. Remove two retaining screws and open SPM door.
- 2. Verify that switches SN3-8 and SN3-9 are set to OFF. If no equipment connects to J5 and J6 on bottom of SPM, set these switches to ON.
- 3. Set switches SN2-1 through SN2-4 as needed, if any changes were made to the M-G set configuration. The settings are:

SN2-1	Selects M-G set 1.	Switch setting is determined by site configuration. Selection of M-G set 1 or 2 is required. ON position enables selection; OFF disables selection. Unused M-G switches may be left in the ON position.
SN2-2	Selects M-G set 2.	
SN2-3	Selects M-G set 3.	
SN2-4	Selects M-G set 4.	
- 4. Close SPM door and install retaining screws.
- 5. Set wall-mounted circuit breaker that controls 50/60-Hz power to SPM to ON. This circuit breaker may not be present at all sites.

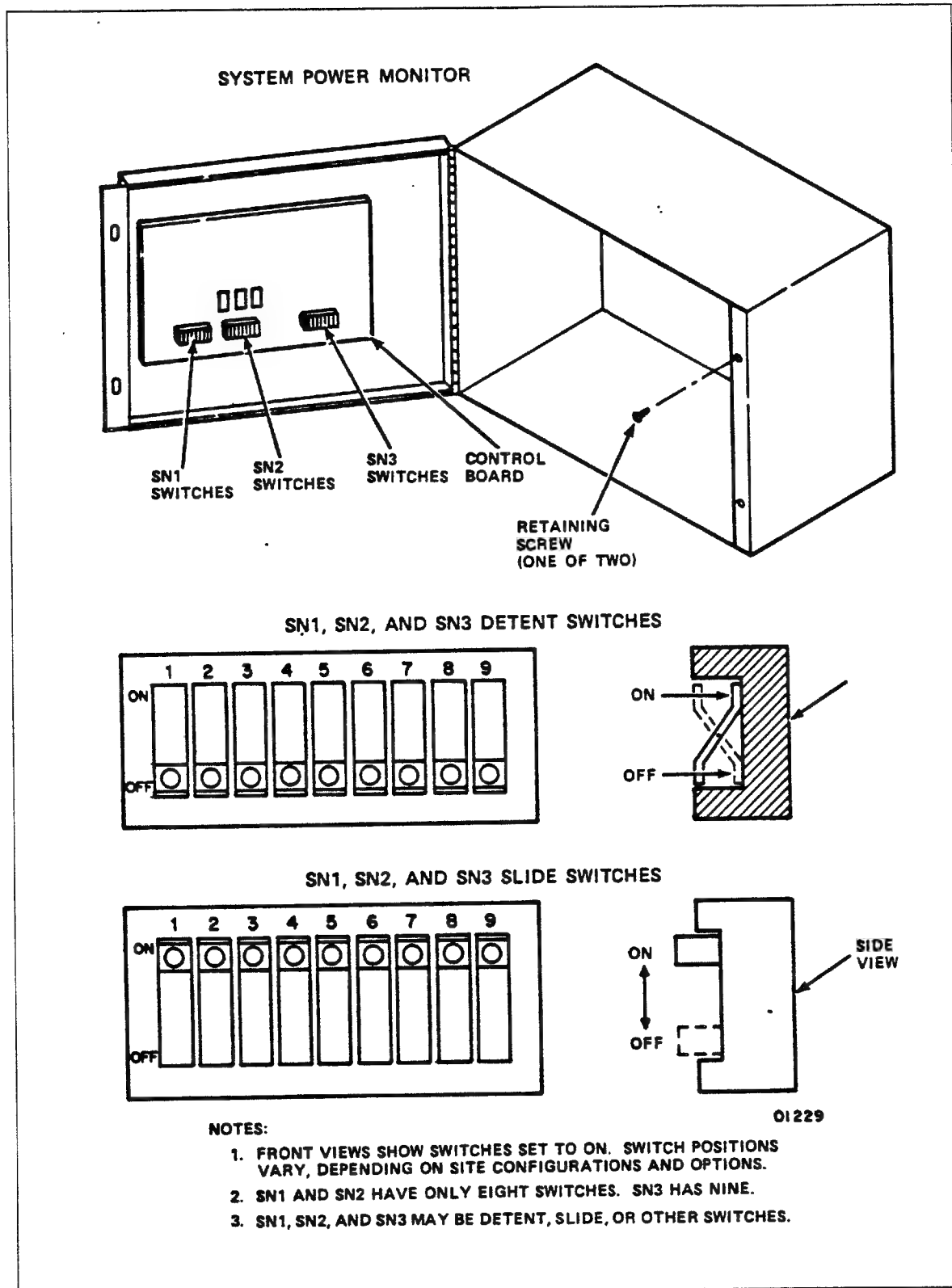


Figure 2-50. Checking SPM Switches SN1, SN2, and SN3

- 6. Set keyswitch on side of SPM to LOCAL.
- 7. Set SYSTEM EMERGENCY switch on interbay to ON.
- 8. Set SYSTEM DISCONNECT switch on left side of SPM to ON. This applies 50/60-Hz power to SPM.
- 9. Press and release LOCAL START switch on front of SPM.

NOTE

Switch SN2-8 in SPM must be set to OFF or COLUMN FAULT indicator lights.

NOTE

Allow 1 min for MG to obtain full output voltage.

- 10. Verify that SYSTEM ON and ROOM ON indicators on SPM are on and SPM cooling fan is running.
- 11. Set selector switch to select system MG being used: selection 1, 2, 3, or 4.
- 12. Set function switch on front of SPM to MG PHASE 1. Verify that MG phase 1 voltage display is between 118 V and 120 V.
- 13. Set function switch to MG PHASE 2. Verify that MG PHASE 2 voltage display is between 118 V and 120 V.
- 14. Set function switch to MG PHASE 3. Verify that MG PHASE 3 voltage display is between 118 V and 120 V.
- 15. Adjust VOLTAGE ADJUST setscrew on front of SPM, if necessary, to obtain correct MG phase voltages.
- 16. Repeat steps 10 through 14 for other M-G sets in system, if applicable.
- 17. Set mode switch on each WCU (as applicable) as follows:
 - Set LOCAL/REMOTE switch on GH251-A, GH251-C, GH252-A or GH252-C (if used) to REMOTE.
 - Set MANUAL/AUTO switch on GH252-A or GH252-C (if used) to MANUAL. These positions allow the SPM or SPCP to remotely control starting and stopping of the WCUs.
- 18. Press STOP switch on front of SPM, and verify powerdown of M-G set and water cooling unit.
- 19. Wait 5 min for MG to power down. Press LOCAL START switch on front of SPM to restart M-G set and water cooling unit. Allow M-G power to remain on for following checks.

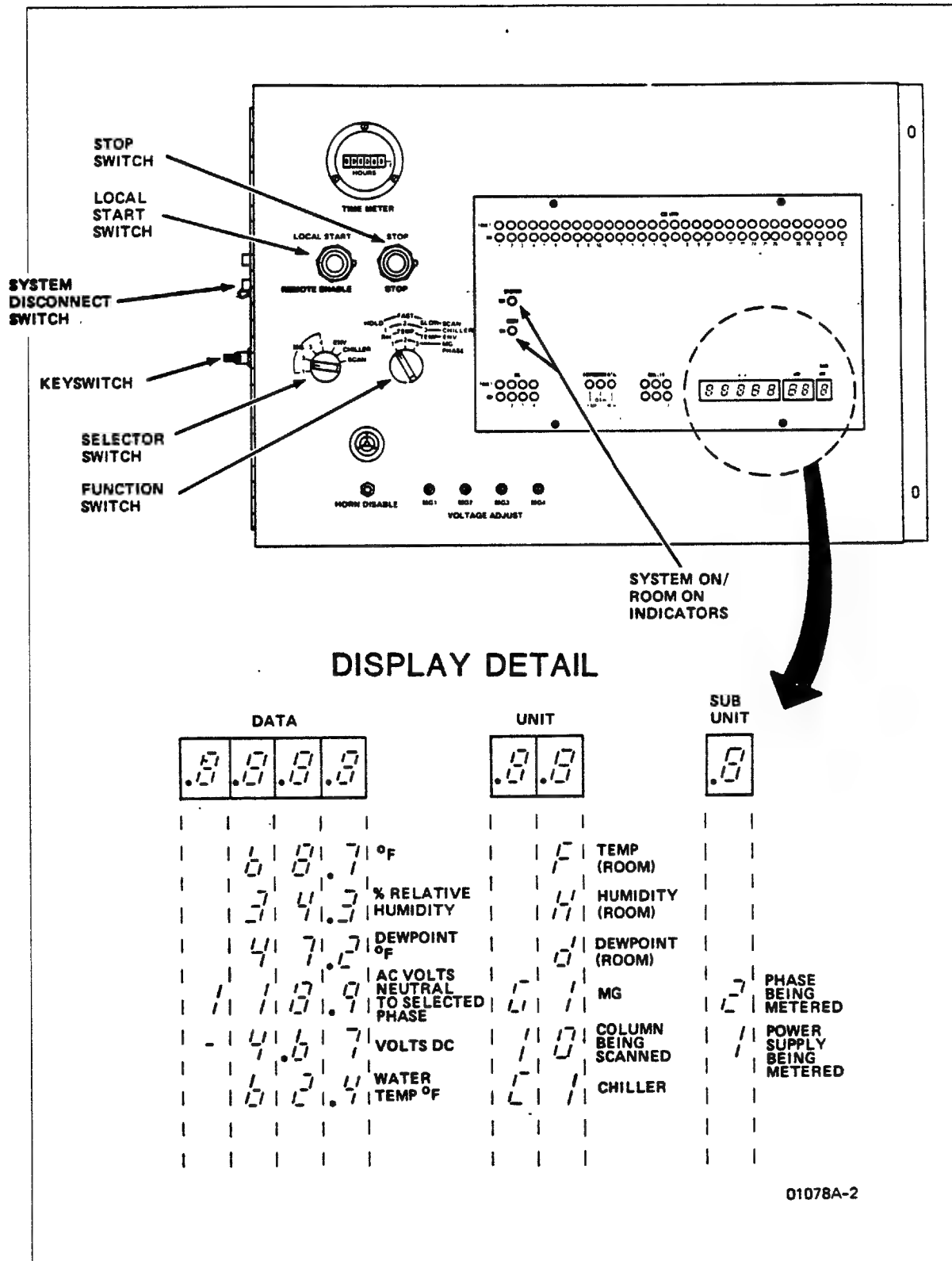


Figure 2-51. Applying M-G Set Power From SPM

Apply Power and Adjust Voltages for IOU NIO Cabinet

Use this procedure for the first application of power to the IOU nonconcurrent input/output (NIO) cabinet and for the adjustment of the IOU NIO logic voltages. Refer to figures 2-52 and 2-53.

NOTE

This procedure includes applying clock (master oscillator) power.

Procedure prerequisites:

- Water cooling unit for both IOU cabinets is operating
- Power has been applied to the IOU NIO cabinet

Tools/parts required

- Digital multimeter, John Fluke Model 8020A or equivalent

Procedure

- 1. Set following circuit breakers and voltage adjust knobs on IOU NIO cabinet power distribution box as follows:
 - a. Set mode switch on top right corner of both IOU NIO and CIO power distribution boxes to LOCAL.
 - b. MAIN DISCONNECT to OFF
 - c. -2.2 V DISCONNECT to OFF
 - d. -5.2 V DISCONNECT to OFF
 - e. -2.2 V ADJUST knob fully counterclockwise
 - f. -5.2 V ADJUST knob fully counterclockwise
- 2. Set circuit breaker CB3 on auxiliary power supply at rear of IOU NIO cabinet to off, (down).
- 3. Set wall-mounted circuit breakers that control 50/60- and 400-Hz power to interbay power panel to ON.
- 4. Set 50/60-Hz MAIN DISCONNECT and 400 Hz MAIN DISCONNECT circuit breakers on interbay power panel to ON.
- 5. Set IOU-1 50/60 Hz circuit breaker and IOU-1 400-Hz circuit breaker on interbay power panel to ON.

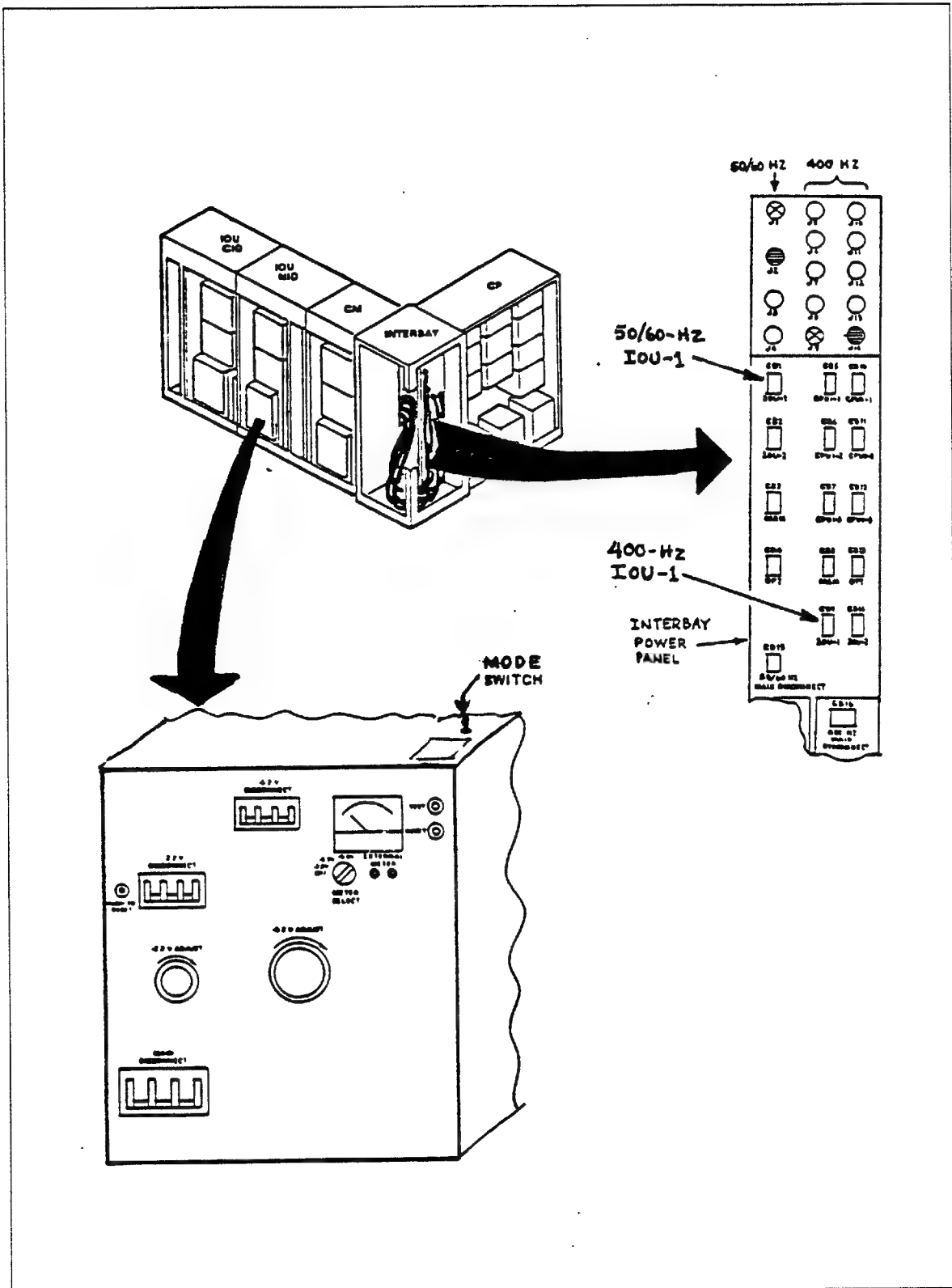


Figure 2-52. IOU NIO Power Controls and Adjustments

- ___ 6. Set CB3 on auxiliary power supply to on, up position.
- ___ 7. Apply IOU NIO cabinet power by sequentially setting section circuit breakers as follows:
 - ___ a. -2.2 V DISCONNECT to ON
 - ___ b. -5.2 V DISCONNECT to ON
 - ___ c. MAIN DISCONNECT to ON
 - ___ d. Press and release RESET switch at front and upper-right corner of power distribution box.
- ___ 8. Listen for noise of circulating air. Cabinet blower must be operating.

CAUTION

Use voltages indicated by V1 V2 V3 label located on power distribution box when adjusting or inspecting -2.2V, -4.7V, and +5.0V terminator and logic voltages on the CP, CM, and IOU columns. If column power distribution box does not display V1 V2 V3 label, use voltages indicated in this manual.

- ___ 9. Adjust -5.2 V as follows:
 - ___ a. Set METER SELECT switch to -5.2 V.
 - ___ b. Turn -5.2 V ADJUST knob slowly on front of power distribution box until multimeter indicates a nominal -5.20 V.
- ___ 10. Check low-temperature sensor voltage and, if necessary, adjust it as follows:
 - ___ a. Set multimeter to measure +9 to 10 V dc using next meter scale greater than 10 V dc.

CAUTION

Place multimeter leads lightly on TB1 terminals to prevent bending of the low-temperature assembly. Bending this assembly may cause an erroneous voltage reading.

- ___ b. Place meter negative (-) lead through hole in cover on low-temperature sensor terminal TB1-1 and positive lead (+) through hole in cover on terminal TB1-3.
- ___ c. Observe multimeter reading. If voltage is not within 9.9 to 10.1 Vdc, adjust potentiometer on low-temperature assembly.
- ___ d. Remove multimeter leads from TB1.
- ___ 11. Set mode switch on top right corner of power distribution box to REMOTE.
- ___ 12. Swing power distribution box into IOU NIO cabinet and install retaining screw.

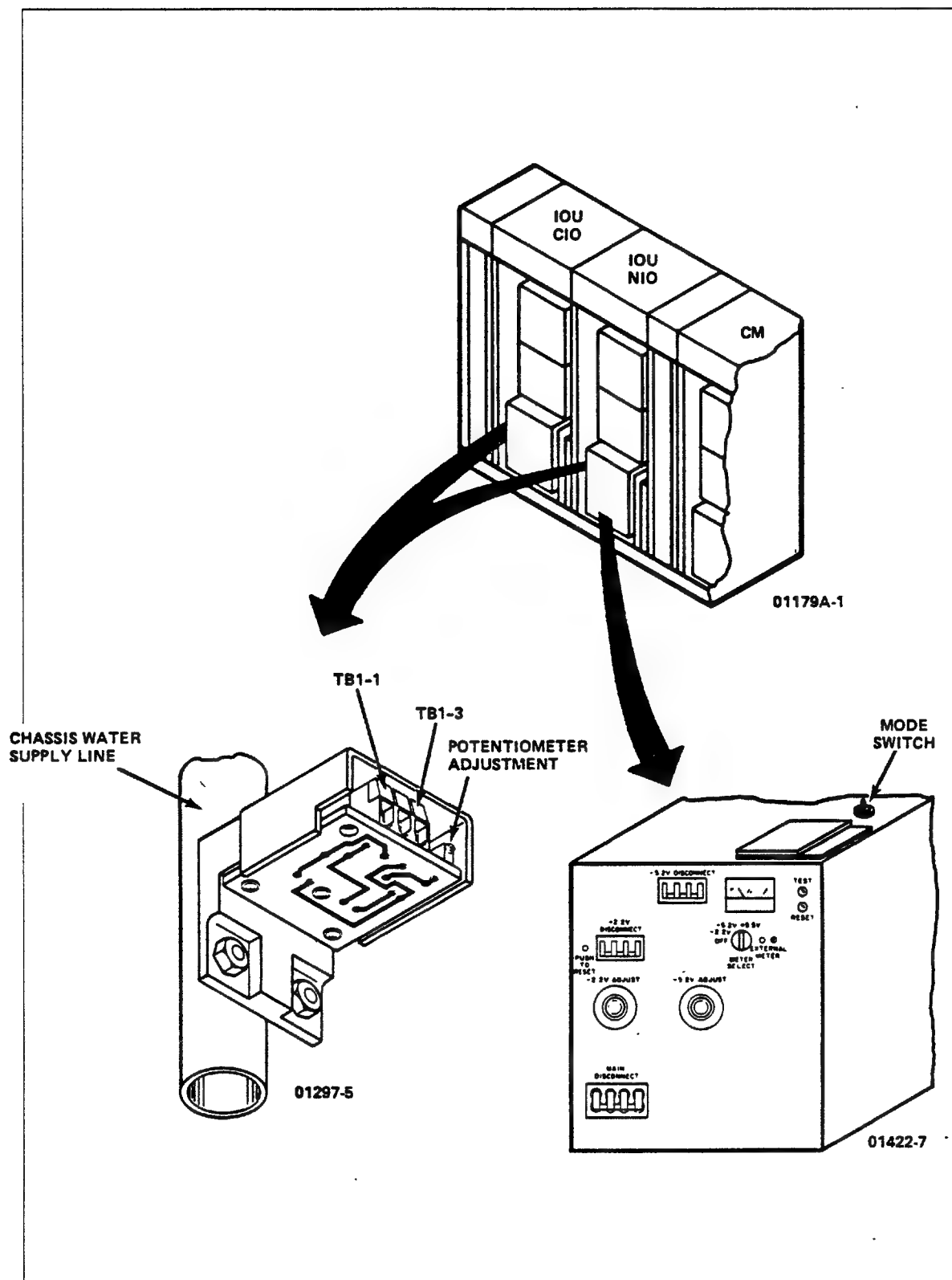


Figure 2-53. IOU NIO Power Distribution Box and Low Temperature Sensor Assembly

Apply Power and Adjust Voltages for IOU CIO Cabinet

Use this procedure for the first application of power to the IOU concurrent input/output (CIO) and for the adjustment of IOU CIO logic voltages. Refer to figures 2-54 and 2-55.

Procedure prerequisites

- Water cooling unit for both IOU cabinets is operating
- Power has been applied to IOU NIO cabinet and voltages adjusted on the IOU NIO cabinet

Tools/parts required

- Digital multimeter, John Fluke Model 8020A or equivalent

Procedure

- ___ 1. Set following circuit breakers and voltage adjust knobs on IOU CIO cabinet power distribution box as follows:
 - MAIN DISCONNECT to OFF.
 - -2.2 V DISCONNECT to OFF.
 - -5.2 V DISCONNECT to OFF.
 - +5.5 V DISCONNECT to OFF.
 - -2.2 V ADJUST knob fully counterclockwise.
 - -5.2 V ADJUST knob fully counterclockwise.
 - +5.5 V ADJUST knob fully counterclockwise.
- ___ 2. Set IOU-2 50/60-Hz circuit breaker and IOU-2 400-Hz circuit breaker on interbay power panel to ON.
- ___ 3. Apply CIO cabinet power by sequentially setting section circuit breakers as follows:
 - ___ a. Set mode switch on top right corner of power distribution box to LOCAL.
 - ___ b. -2.2 V DISCONNECT to ON
 - ___ c. -5.2 V DISCONNECT to ON
 - ___ d. +5.5 V DISCONNECT to ON
 - ___ e. MAIN DISCONNECT to ON
 - ___ f. Press and release RESET switch at upper-right corner of power distribution box.
- ___ 4. Listen for noise of circulating air. Cabinet blower must be operating.

- 5. Connect multimeter to EXTERNAL METER test points on front panel of CIO power distribution box.

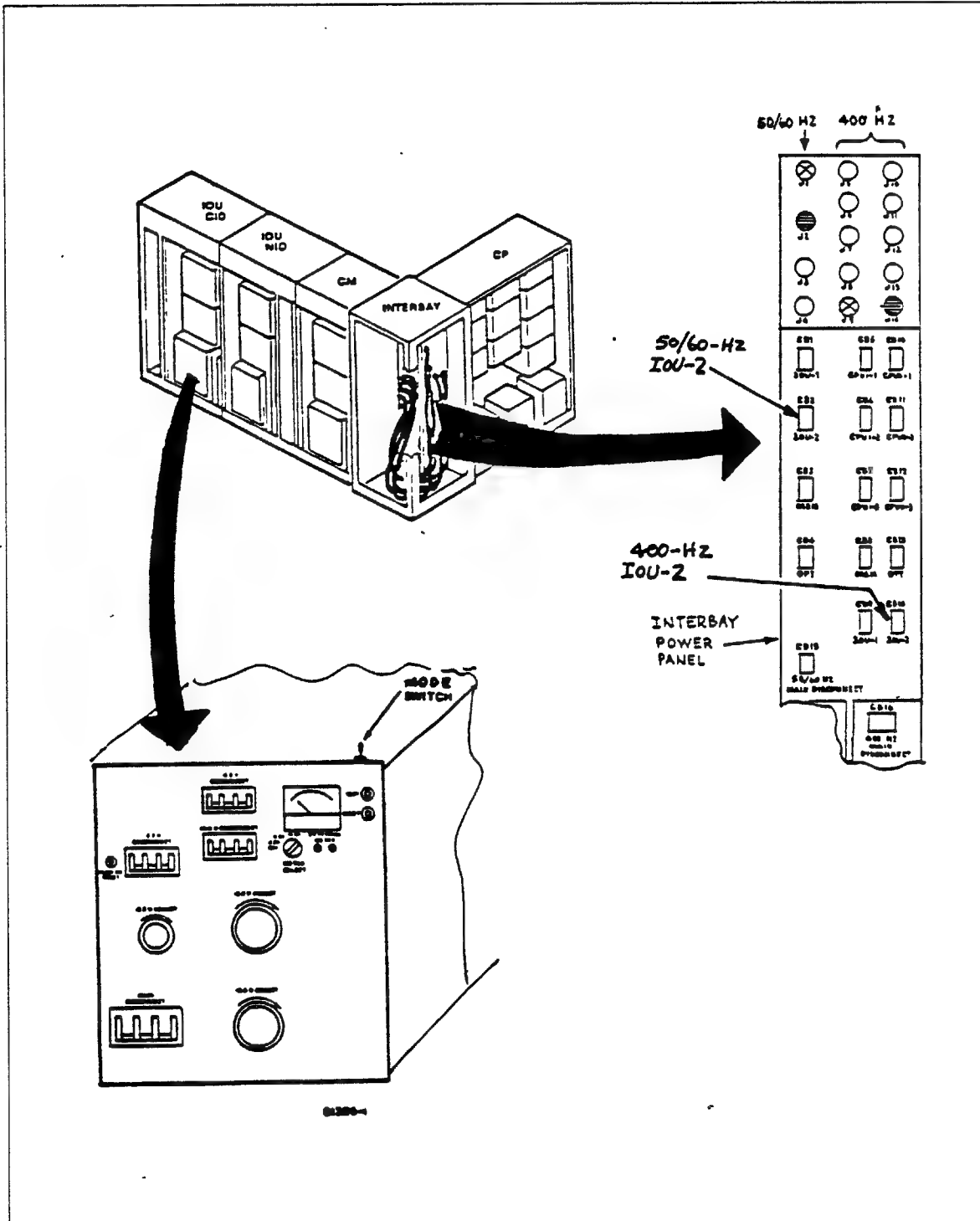


Figure 2-54. IOU CIO Power Controls and Adjustments

CAUTION

Use voltages indicated by V1 V2 V3 label located on power distribution box when adjusting or inspecting -2.2V, -4.7V, and +5.0V terminator and logic voltages on the CP, CM, and IOU columns. If column power distribution box does not display V1 V2 V3 label, use voltages indicated in this manual.

- ___ 6. Adjust -5.2 V as follows:
 - ___ a. Set METER SELECT switch to -5.2 V.
 - ___ b. Turn -5.2 V ADJUST knob slowly on front of power distribution box until multimeter indicates a nominal -5.20 V.
- ___ 7. Adjust -2.2 V as follows:
 - ___ a. Set meter SELECT SWITCH to -2.2 V.
 - ___ b. Turn -2.2 V ADJUST knob slowly on front of power distribution box until multimeter indicates a nominal -2.20 V.

NOTE

Adjust the +5.5 V after adjusting the -2.2 V and -5.2 V.

- ___ 8. Adjust CIO power supply +5.5 V as follows:
 - ___ a. Set meter SELECT SWITCH to +5.5 V.
 - ___ b. Turn +5.5 V ADJUST knob slowly on front of power distribution box until multimeter indicates a nominal +5.00 V.
 - ___ c. Adjust R6 at rear of percentage meter to obtain a percentage meter indication of 0. If R4 or R5 did not require adjustment, gain access to R6 by swinging power distribution box outward from cabinet and removing top plate.
 - ___ d. Disconnect multimeter from EXTERNAL METER test points.
 - ___ e. Install top plate, if removed earlier, on power distribution box.
- ___ 9. Check low-temperature sensor voltage and, if necessary, adjust it as follows:
 - ___ a. Set multimeter to measure 9 to 10 Vdc using next meter scale greater than 10 Vdc.

CAUTION

Place multimeter leads lightly on TB1 terminals to prevent bending of the low-temperature assembly. Bending this assembly may cause an erroneous voltage reading.

- ___ b. Place meter negative (-) lead through hole in cover on low-temperature sensor terminal TB1-1 and positive lead (+) through hole in cover on terminal TB1-3.

- ___ 11. Swing power distribution box into IOU CIO cabinet and install retaining screw.

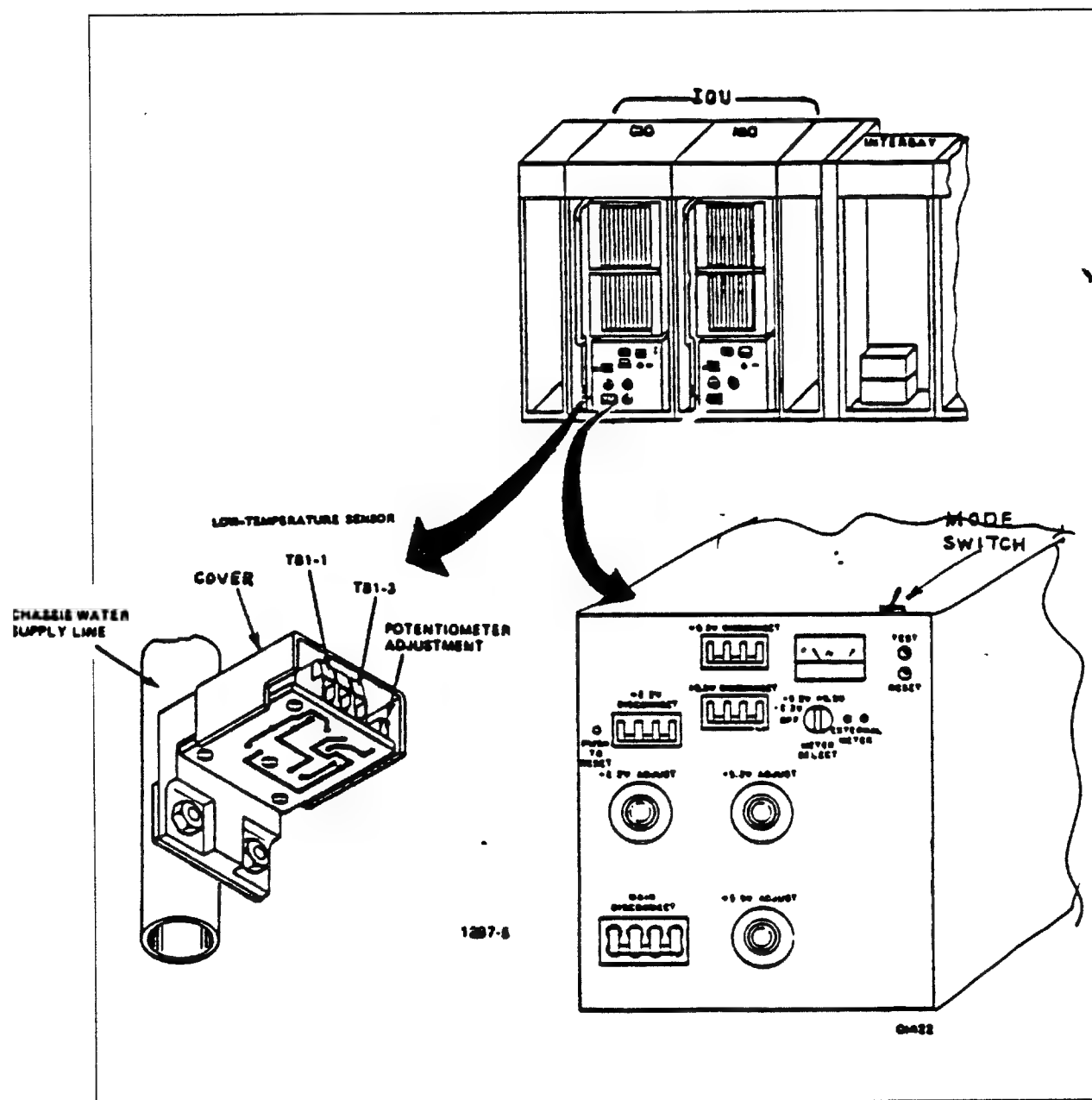


Figure 2-55. IOU CIO Power Distribution Box and Low Temperature Sensor Assembly

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Check Water Flow Rates

Use this procedure to check the settings of the water flow rates through the columns of the various system cabinets. Perform this check after stabilization of the water flow through the computer system.

Procedure prerequisite

- Voltage adjustments of IOU NIO and IOU CIO cabinets are complete
- Water flow through the WCU and in columns of system cabinets has stabilized.

Procedure

- ___ 1. Adjust control valves on water flow meters on under-floor water manifolds as necessary, to the following flow rates:
 - ___ a. CP-0 and CP-1 column 1 flow rates: 11.3 L (3 gal) per min.
 - ___ b. CP-0 and CP-1 column 2 flow rates: 11.3 L (3 gal) per min.
 - ___ c. CP-0 and CP-1 column 3 flow rates: 15.1 L (4 gal) per min.
 - ___ d. CM column flow rate: 7.6 L (2 gal) per min.
 - ___ e. IOU NIO cabinet, 2-coil units: 15.1 L (4 gal) per min, 3-coil units: 22.7 (6 gal) per min.
 - ___ f. IOU CIO cabinet, 2-coil units: 15.1 L (4 gal) min, 3-coil units: 22.7 (6 gal) per min.
- ___ 2. Install all covers on flow meters.
- ___ 3. Check water cooling unit for following gauge readings:

- ___ a. PUMP OUTLET PRESSURE (psig)

Power	GH251-A/B	GH251-C	GH252-A	GH252-C
60-Hz:	276-379 kPa (40-55 psi)	483-685 kPa (70-92 psi)	276-379 kPa (40-55 psi)	331-428 kPa (48-62 psi)
50-Hz:	173-241 kPa (25-35 psi)	276-414 kPa (40-60 psi)	173-241 kPa (25-35 psi)	241-310 kPa (35-45 psi)

- ___ b. CHASSIS WATER TEMPERATURE gauge:

16.7°C to 18.3°C (62°F to 65°F)

- ___ c. CHILLED WATER TEMPERATURE gauge:

4.4°C to 10.0°C (40°F to 50°F)

NOTE

If adjustments are required to obtain correct pressure and temperature, refer to either of WCU installation sections under heading, Check Water Cooling Unit Temperature, Pressure, and Flow.

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Install Secondary IOU

The secondary IOU consists of an AT478-A and an AT481-A internally modified by a factory-installed AT501-B conversion kit. General categories of installation tasks performed in this sub-chapter are as follows:

- Preinstallation and Site Preparation
- Unit Installation
- Install Power
- Connect Secondary IOU Cables
- Final Secondary IOU Procedures

Preinstallation and Site Preparation

This section contains the initial site preparations that are required prior to the arrival of the secondary IOU. The preparations include tasks to be performed by the customer and by Control Data personnel. Completion of all the preinstallation tasks prepares the site for installation and checkout of the secondary IOU with the central computer.

These tasks are:

- Obtain Special Tools and Equipment
- Prepare the Site for Preinstallation
- Inspect the Site
- Check Bill of Lading for Preinstallation Equipment
- Uncrate, Check for Damage, and Verify Shipping Lists
- Install Water Hose Assemblies, Manifolds, and Hoses
- Check SPM Operation With M-G Set

Tools and parts required for the tasks include the following:

Marking pen

Masking tape

Diagonal cutter or knife

Cable-tie identifiers or masking tape for labeling cables

Assemblies required:

Site supply water hose assembly for water cooling unit

Site return water hose assembly for water cooling unit

Water manifolds and hoses required for IOU installation:

Two 5-port distribution manifolds

One 3-port water supply and return manifolds for IOU

Four hoses, 2.4 m (8 ft) long, 1.9 cm (0.75 in) diameter for IOU

Two hoses, 3.2 m (10 ft) long, 2.5 cm (1.00 in) diameter from distribution manifolds to 3-port manifolds

2 hoses, 7.6 m (25 ft) long, 5 cm (2.00 in) diameter from 220-L/min (58-gal/min) water cooling unit to distribution water manifolds

Obtain Special Tools and Equipment

Table 2-5 lists the special tools, test equipment, and materials that are essential to the installation of the secondary IOU. These items must be at the computer site prior to the arrival of the secondary IOU.

NOTE

The table does not include maintenance and troubleshooting tools. These tools require ordering from the ORMIC (operational model for maintenance inventory control) parts list.

Table 2-5. Special Tools, Test Equipment, and Materials

Qty	Description	Use	Part Number	Note
4	Antistatic wrist strap, small	Connecting cables	12263623	1
4	Antistatic wrist strap, large	Connecting cables	12263496	1
1	Multimeter, John Fluke model 8020A	General use	12263279	1
1 per installer	Antistatic smocks: • Small • Medium • Large	Worn during all installation phases	Unavailable	1
2	Rol-a-lifts	Placing secondary IOU	None	2
2	Allen wrench, 4-mm	Unlocking/locking secondary IOU doors	None	3
AR	Tie wrap, 100-mm (3.6-in)	General use such as holding cables and hoses in place	17620300	1
AR	Tie wrap, 200-mm (7.4-in)	General use such as holding cables and hoses in place	17620301	1
AR	Tie wrap, 292.-mm (14-in)	General use such as holding cables and hoses in place	17620303	1

Notes:

1. Ordered through Control Data by site personnel.
2. Provided by shipping carrier.
3. Obtained locally by site personnel.
4. AR = As Required.

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Prepare the Site for Preinstallation

The customer has the responsibility of making initial site preparations. These preparations include the installation of some Control Data parts and equipment that arrive at the site in early-shipment kits, approximately two weeks before the arrival of the secondary IOU.

The following list summarizes the initial site preparations to be performed by the customer.

Raised-Floor Installation

- ___ 1. Use full-size floor template (provided by Control Data) to mark placement of secondary IOU and floor cutouts.
- ___ 2. Cut floor cutouts, determined by floor template, in floor tiles for power wiring, signal cables, and water hoses. To ensure that secondary IOU will sit flat, floor cutouts must not have edging that protrudes above floor surface.

Water Line Installations

- ___ 1. Refer to the Section 2 Site Preparation manual for installation information.
- ___ 2. Install site (customer) water supply and return lines so that ends of lines are a maximum of 2.1 m (7 ft) from water cooling unit connections. Water lines must have insulation to prevent water condensation.

CAUTION

The site supply and return water lines must be flushed clean and free of debris to prevent possible damage to the water cooling unit(s).

- ___ 3. Flush site water supply and return lines to ensure that they are free of air and debris.

M-G Set Installation and Local Testing

NOTE

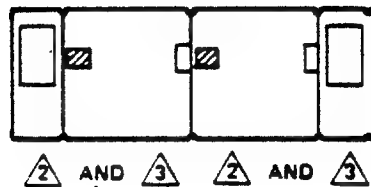
Depending on site configuration, a second M-G set may be required when installing the secondary IOU. Contact the site planner for more information.

- 1. Refer to the Section 1 Site Preparation manual for general installation information.
- 2. Refer to the Section 4 Site Preparation manual for M-G set specification sheets.
- 3. Refer to the M-G Set HMM for detailed installation and testing when the M-G set is a Control Data product. Ensure that M-G testing includes a check for proper rotation.

50/60-Hz and 400-Hz Power Distribution Installation

- 1. Refer to the Sections 1 through 4 Site Preparation manuals for general installation information.
- 2. Perform site power wiring as detailed on the site power distribution diagram (provided by site planner). This wiring includes the following:
 - a. Connecting power plugs (supplied by Control Data in the early-shipment kit) to the power wiring ends that go to the secondary IOU and water cooling unit(s), unless local electrical codes require direct-wired power connections. Refer to figure 2-56 for an explanation of power plug types and locations.

Reduction adapters are shipped with the power plugs to allow their adaptation, as necessary, to various diameter sizes of customer power runs.
 - b. Connecting insulated grounding conductors that are identical in size, insulation material, and thickness to the grounded and ungrounded branch-circuit supply conductors. The insulation of the grounding conductors must be green and may or may not have one or more yellow stripes. The grounding conductors must be installed as part of the circuit that supplies the system units.
 - c. Grounding the grounding conductors (substep a) to earth at the service equipment or at an acceptable building earth ground such as the building frame in the case of a high-rise steel-frame structure.
 - d. Using grounding type attachment-plug receptacles for connections to the system units. Connect grounding connectors that serve the attachment-plug receptacles to earth ground at the service equipment or at an acceptable building earth ground. For example, this ground may be the building frame in the case of a high-rise steel-frame structure.



- △ 2 400-Hz, 3-PH, 30-A, USE HUBBEL CONNECTOR 530C2W.
- △ 3 FOR 50-Hz, 1-PH, 20-A, USE HUBBEL CONNECTOR 320C8W.
FOR 60-Hz, 1-PH, 20-A 1, USE HUBBEL CONNECTOR 320C4W.

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Figure 2-56. Customer-Installed Power Plugs

Inspect the Site

Use this procedure as a general guide to inspect the site power wiring, water lines, air conditioning, and floor cutouts to ensure that the site is ready for the secondary IOU installation.

Raised-Floor Inspection

- 1. Use full-sized floor template (provided by Control Data) to verify correct location of floor cutouts.
- 2. Use template to verify that secondary IOU outline is accurately marked on floor to ensure exact placement of units during installation.

Air Conditioning Inspection

- 1. Check with customer that site air conditioning is operable.

Water Line Inspection

- 1. Measure distance between ends of site (customer) water lines and water cooling unit(s) to ensure that distance is a maximum of 2.1 m (7 ft) to permit water hose assemblies to reach cooling unit(s).
- 2. Observe that quick coupling adapters (supplied with preinstallation parts and equipment) are installed on ends of site water supply and return lines.

Power Inspection

- 1. Make sure that all 50/60- and 400-Hz power to all preinstalled equipment, wall-mounted boxes, and power runs is shut off.

NOTE

Any electrical work resulting from the following inspection must be made by a licensed electrician according to local codes.

- 2. Obtain site power distribution diagram (prepared by site planner) from site personnel. Verify that all wiring is correct by comparing it to diagram. Have any wiring errors corrected.
- 3. Inspect all power wiring for obvious damage and for loose connections. Replace any damaged wiring and tighten any loose connections.
- 4. Check that local testing of M-G set is completed.

Telephone and Modem Inspection

- 1. Check to see that a telephone and modem are installed and that they are operational for remote technical assistance use.

Check Bill of Lading for Preinstallation Equipment

Use this procedure to verify the bill of lading. The bill of lading normally lists the containers of the preinstallation parts and equipment. It arrives with the equipment and in the possession of the carrier. Verification of the bill of lading is necessary immediately upon delivery of the equipment at the site.

- 1. Obtain bill of lading and shipping documents from carrier immediately upon arrival of carrier at the site.
- 2. Verify shipped containers against those recorded on bill of lading.

Uncrate, Check for Damage, and Verify Shipping Lists

Use this procedure to remove preinstallation equipment from its containers, check its condition, and verify it with the shipping lists. The shipping lists arrive with the equipment and are normally attached to the outsides of the shipping containers.

Tool required

- Diagonal cutter or knife

Procedure

1. Remove and read any special uncrating instructions and shipping lists attached to outer surfaces of shipping containers.

WARNING

Use caution when cutting shipping bands from containers to prevent the bands from snapping outward and causing personal injury.

2. Cut shipping bands and open containers.
3. Compare contents of containers with shipping lists that are attached to containers. Report any missing parts or equipment promptly to carrier and to Control Data.
4. Inspect parts and equipment for damage. Report any damaged equipment or parts promptly to carrier and to Control Data.
5. Acknowledge a complete shipment by signing carrier's bill of lading.

Install Water Hose Assemblies, Manifolds, and Hoses

The following procedures describe the preinstallation placement and connections of site water hose assemblies, and the placement, labeling, and connections of water manifolds and their associated hoses. These procedures consist of the following tasks:

- Place and Connect Site Supply and Return Hose Assemblies
- Install Water Manifolds and Hoses

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Install Water Hoses and Manifolds

Use this procedure to place water manifolds and to connect, label, and place associated water hoses from the manifolds to the floor cutouts of the secondary IOU units.

Water manifolds and hoses required for secondary IOU installation:

- One 5-port distribution water manifold for secondary IOU
- One 3-port water supply and return manifold assemblies for secondary IOU
- 2 hoses, 2.4 m (8 ft) long, 1.9 cm (0.75 in) diameter for secondary IOU
- 2 hoses, 3.5 m (10 ft) long, 2.5 cm (1 in) diameter from 5-port distribution manifold to 3-port supply and return manifold assemblies
- 2 hoses, 7.6 m (25 ft) long, 5 cm (2 in) diameter from 220-L/min (58-gal/min) water cooling unit to distribution water manifold

Parts required

- Marking pen and masking tape to label water hoses

Procedure

- 1. Place 5-port distribution manifolds and 3-port supply and return manifold assembly under raised floor in locations shown in figure 2-57 as follows:
 - a. Remove four tiles to provide a floor opening above the length of the intended manifold locations.
 - b. If necessary, remove adjacent stringers across floor tile opening to allow placement of 5-port distribution manifold. If stringers cannot be removed because of their length, customer must cut stringers and install additional stringer supports to allow their removal and later replacement.
 - c. Label one 5-port distribution manifold SUPPLY and label other distribution manifold RETURN. Use masking tape and marking pen.
 - d. Place 5-port distribution manifolds under raised floor.

CAUTION

Handle the manifold assemblies carefully. The flow meters on the return manifold are fragile and will break easily.

- e. Place 3-port supply and return water manifold assembly under raised floor.
 - f. Replace removed floor stringers.
- 2. Place and connect hoses between 5-port distribution manifolds and 3-port supply and return manifold assemblies as follows:
 - a. Connect one end of a 3.05 m (10 ft) long, 2.5 cm (1 in) diameter hose to 5-port distribution manifold labeled SUPPLY and a second hose to 5-port distribution manifold labeled RETURN.
 - b. Place other ends of hoses under raised floor and connect them to ends of 4-port supply and return manifold assembly adjacent to IOU.

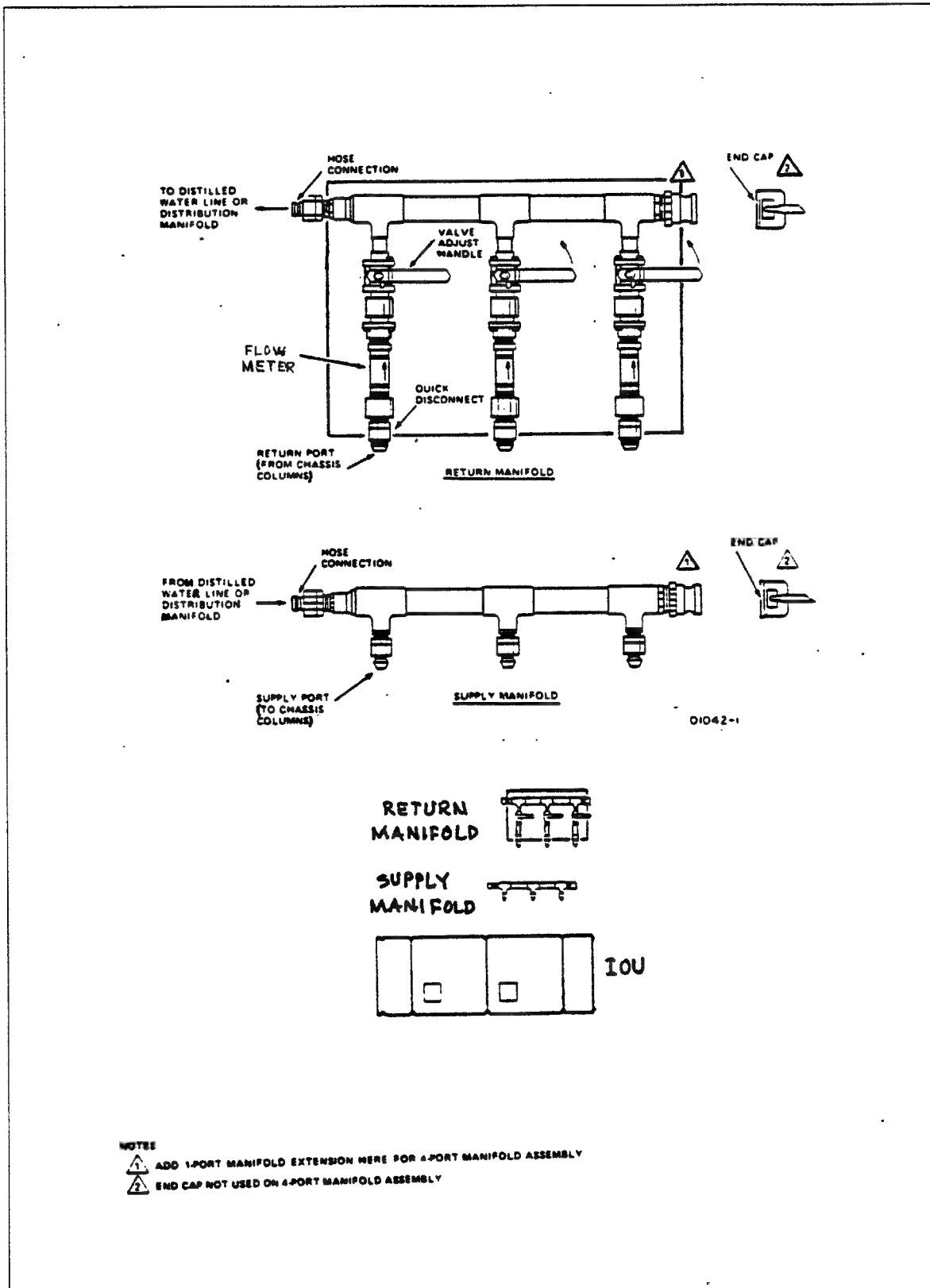


Figure 2-57. 3-Port Water Manifold Placement for IOU

- 3. Connect one end of a 2.4 m (8 ft) long, 1.9 cm (0.75 in) diameter hose labeled S15 to 3-port supply manifold and one end of a second hose labeled R15 to 3-port return water manifold (figure 2-58). Place other ends of hoses near water cutout for NIO section in secondary IOU.
- 4. Connect one end of a 2.4 m (8 ft) long, 1.9 cm (0.75 in) diameter hose labeled S16 to 3-port supply manifold and one end of a second hose labeled R16 to 3-port return water manifold. Place other ends of hoses near water cutout for CIO section in secondary IOU.

NOTE

Even if the optional CIO logic is not present, the water hoses still connect to the CIO section.

- 5. Connect one end of a 7.6 m (25 ft) long, 5 cm (2 in) diameter hose to end of 5-port distribution supply manifold. Place other end at water cutout for water cooling unit.
- 6. Connect one end of a 7.6 m (25 ft) long, 5 cm (2 in) diameter hose to end of 5-port distribution return manifold. Place other end at water cutout for water cooling unit.

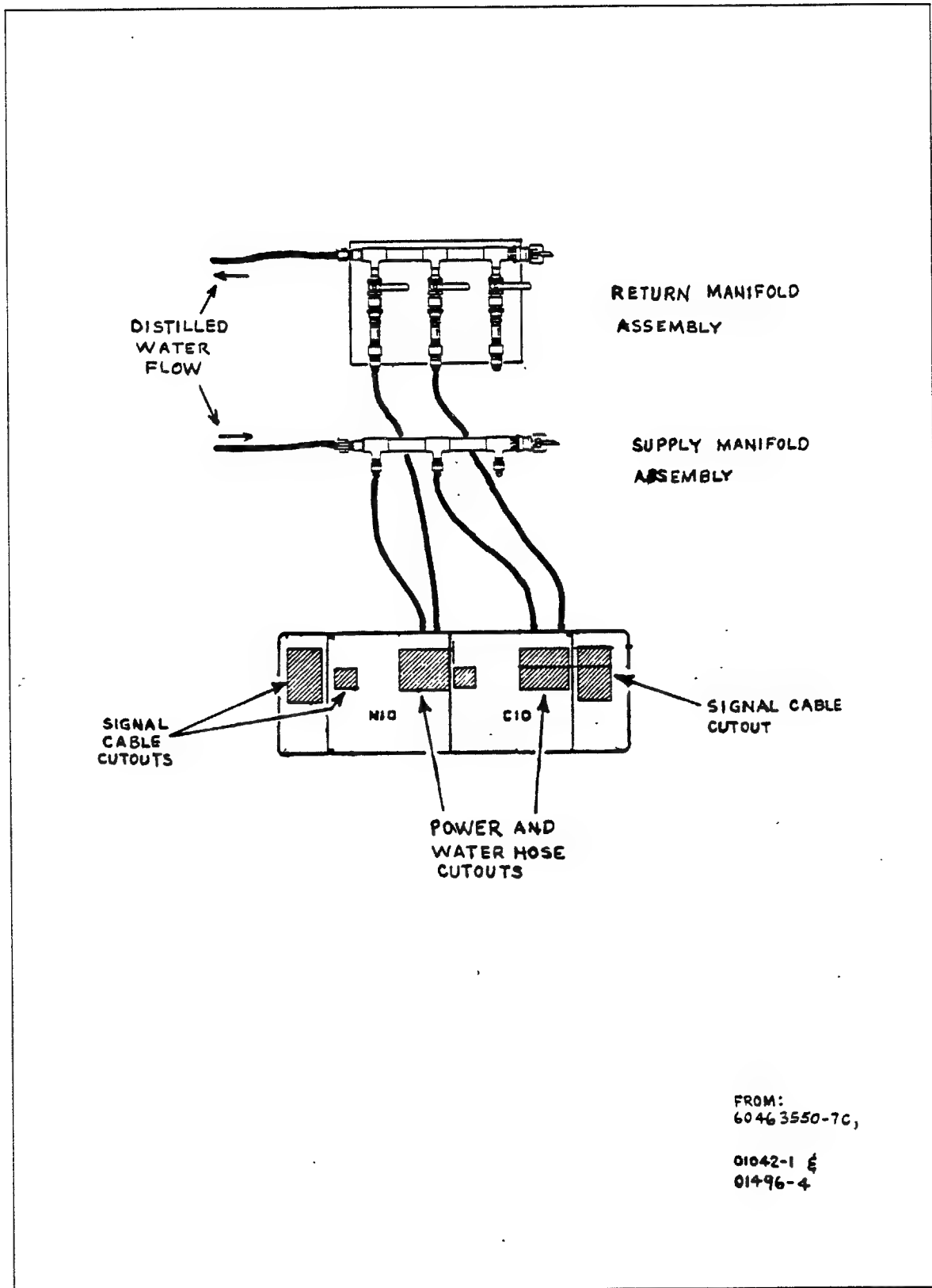


Figure 2-58. Hose Connections for Secondary IOU

Check SPM Operation with M-G Set

Use this procedure to ensure the ability of the system power monitor (SPM) to operate and remotely control the M-G set. Refer to figure 2-59.

Procedure prerequisites

- The procedures for Checking SPM Preoperating Conditions are complete.
- The M-G set has been installed and operated in the local mode. It is now shut off and is set for operation in remote mode.

Procedure

- ___ 1. Apply 50/60-Hz power to SPM as follows:
 - ___ a. Set keyswitch on left side of SPM to LOCAL.
 - ___ b. Set wall-mounted circuit breaker that controls 50/60-Hz power to SPM to ON.
 - ___ c. Set wall-mounted circuit breaker that controls 400-Hz power to SPM to ON.
 - ___ d. Set SYSTEM DISCONNECT switch on left side of SPM to ON. Air blows from left air vent, and SYSTEM indicator lights on SPM.
- ___ 2. Set switches on front of SPM as follows:
 - ___ a. Set selector switch to MG being used (MG1, MG2, MG3, or MG4).
 - ___ b. Set function switch to MG PHASE1.
- ___ 3. Press and release LOCAL START switch on front of SPM. ROOM ON, SYSTEM ON, and MG ON indicators on front of SPM light.
- ___ 4. Wait a minimum of 1 min to allow MG to reach and apply its full output voltage. Then observe following digital displays on SPM.
 - ___ a. UNIT display shows MG selected for monitoring (G1, G2, G3, or G4).
 - ___ b. SUB UNIT display shows voltage phase of MG selected for monitoring (1, 2, or 3).
 - ___ c. DATA display shows phase-to-neutral voltage of MG being monitored.
- ___ 5. Check voltages of phases as follows:
 - ___ a. Observe a phase 1 voltage of 118 to 120 V.
 - ___ b. Set display selector switch to MG PHASE2. Observe voltage of 118 V to 120 V.
 - ___ c. Set display selector switch to MG PHASE3. Observe voltage of 118 V to 120 V.
 - ___ d. Adjust SPM VOLTAGE ADJUST control (MG1, MG2, MG3 or MG4) for MG being used, if required to obtain correct M-G voltage readings.

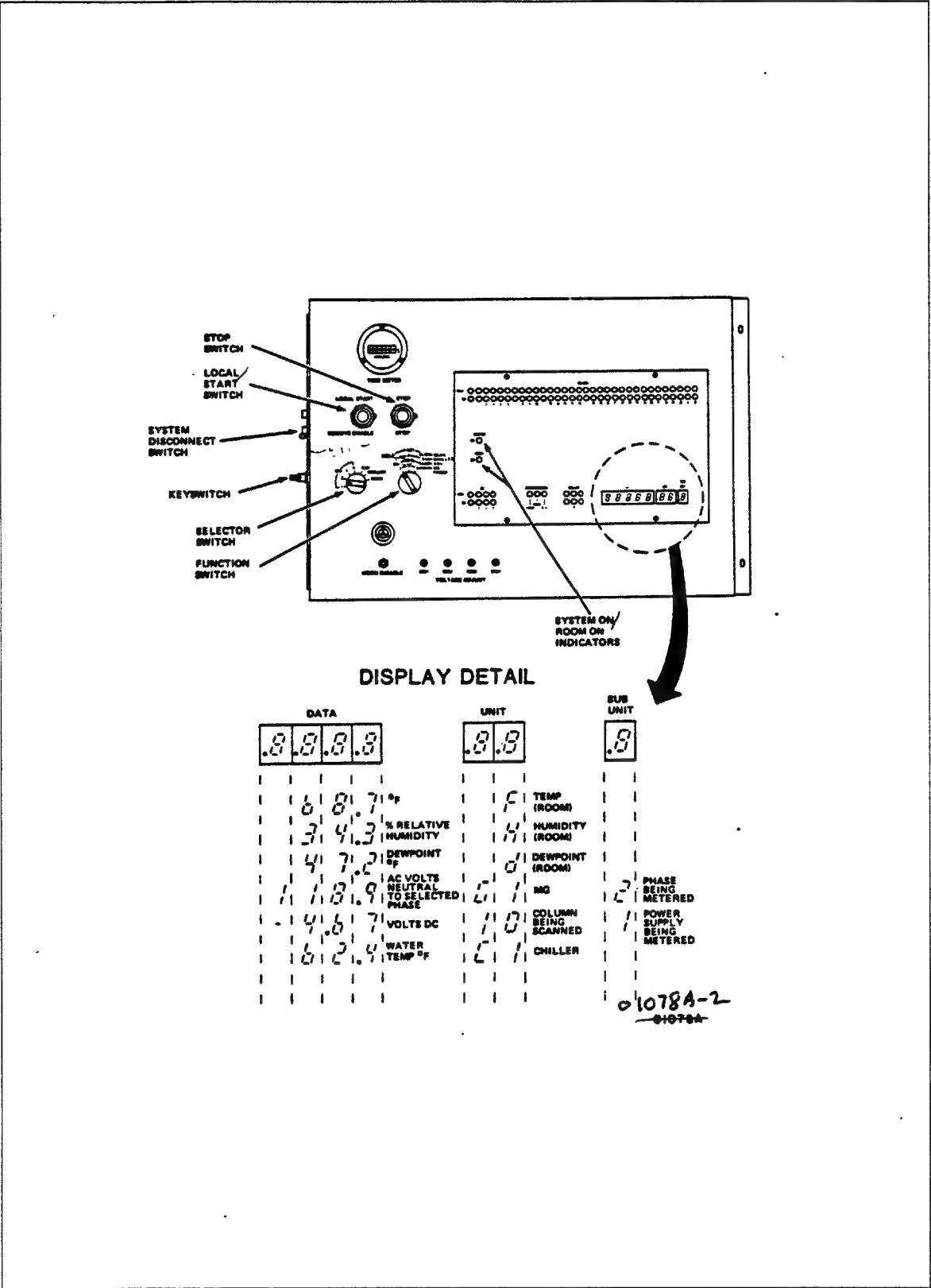


Figure 2-59. System Power Monitor

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- 6. Press and release STOP switch on front of SPM. This causes removal of power from MG and water cooling unit(s).
- 7. Set to OFF the wall-mounted circuit breaker that controls 50/60-Hz power to SPM.
- 8. Set switches SN3-8 and SN3-9 on SPM control board to OFF for normal operation, following installation.
- 9. Close SPM door and install two retaining screws.

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Unit Installation

Use the procedures in the following paragraphs to install the secondary IOU. Installation of the IOU requires at least two installers and is the responsibility of the lead installer to assign tasks to the other installer.

Unit installation prerequisites are:

- Preinstallation has been completed.

Unit installation includes the following tasks:

- Check Bill of Lading
- Uncrate, Check for Damage, and Verify Shipping List
- Place Secondary IOU

Tools/Parts required for the tasks include the following:

- Antistatic Smock
- Diagonal cutter or knife
- Rol-a-Lifts, two

CAUTION

Wear an antistatic smock throughout the installation to prevent damage to microcircuits.

Check Bill of Lading

Use this procedure to verify the bill of lading upon the arrival of the secondary IOU at the site.

NOTE

This task, Checking the Bill of Lading, does not necessarily need to be done by the lead installer. He may elect to delegate it to another person who is a Control Data Engineering Services representative.

The secondary IOU equipment is shipped to the site in an individual container, marked with a container number. This container and its number are normally on a bill of lading, which arrives with the equipment in the possession of the carrier.

- 1. Obtain bill of lading and shipping documents from carrier as soon as carrier arrives at the site.
- 2. Verify shipped containers against those recorded on bill of lading.
- 3. Sign for receipt of shipment only after entire shipment is accounted for and inspected for damage.

Uncrate, Check for Damage, and Verify Shipping Lists

Use this procedure to remove delivered secondary IOU from its container. Check unit for any shipping damage, and verify the presence of all parts by comparing them to the shipping lists that arrive with the unit.

NOTE

Depending on the site space limitations, it may be advantageous to perform the uncrating after the placement of the secondary IOU .

Uncrating and placement of the secondary IOU unit are interactive procedures. Read and become familiar with both before proceeding.

Tools required

- Diagonal cutter or knife
- Antistatic smock

Procedure

- ___ 1. Remove and read any special uncrating instructions and shipping lists attached to outer surfaces of shipping containers.

CAUTION

Wear an antistatic smock throughout the installation to prevent damage to microcircuits.

- ___ 2. Put on an antistatic smock and wear it throughout the installation.

WARNING

Use caution when cutting shipping bands from containers to prevent the bands from snapping outward and causing personal injury.

- ___ 3. Unpack secondary IOU unit.
- ___ 4. Inspect unit for damage.
- ___ 5. Use a plastic shipping cover as a refuse container for scrap shipping materials.
- ___ 6. Compare contents of containers with shipping list. Report any missing containers, parts, or damage promptly to carrier and Control Data.
- ___ 7. Acknowledge a complete shipment by signing carrier's bill of lading.

Place Secondary IOU

Use this procedure to place the secondary IOU at designated floor location. The floor location has cutouts for power and cooling connections. The secondary IOU outline, placed during preinstallation, precisely defines the secondary IOU location. Refer to figure 2-60.

Procedure prerequisites

- Level floor
- Precut cutouts in the raised floor tiles for power and cooling connections
- A floor outline that defines the unit placement locations

Equipment required

- Two Rol-a-lifts

WARNING

Use care when moving a unit with Rol-a-lifts to prevent Rol-a-lift wheels from rolling into a floor cutout. When it is necessary to move a Rol-a-lift over a floor cutout, temporarily replace the cutout tile(s) with uncut tile(s).

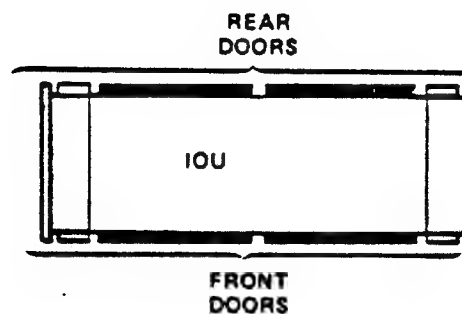
Procedure

- 1. Using two Rol-a-lifts, carefully place edge of secondary IOU cabinet on edge of cutout floor tile(s) so solid floor tiles in front of cabinet can be removed for ease of making water hose and electrical connections later.
- 2. Remove secondary IOU doors from locations shown in figure as follows:
 - a. Open door and lift it upward.

CAUTION

To prevent bending the top door hinge pin, do not tilt the door more than is necessary to remove it.

- b. Tilt bottom of door slightly to one side, just enough to clear bottom hinge pin.
- c. Lower door off of top hinge pin.



NOTE:

**DARKENED AREAS INDICATE DOORS REMOVED
DURING INSTALLATION OF UNITS.**

Figure 2-60. Removing Secondary IOU Doors

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Water Hose Installation

This sub-section contains the procedures necessary to connect water hoses to the secondary IOU.

Water hose installation prerequisites are:

- Placing of secondary IOU is complete

Water hose installation includes the following task:

- Connect 3-Port Manifold Assembly to Secondary IOU

Tools/parts required for the tasks include the following:

- Antistatic smock
- Phillips screwdriver

CAUTION

Wear an antistatic smock throughout the installation to prevent damage to microcircuits.

Connect 3-Port Manifold Assembly to Secondary IOU

Use these procedures to connect water hoses to the secondary IOU. Refer to figure 2-61.

Procedure prerequisites

- Placing of secondary IOU is complete.
- The 3-port supply and return manifold assembly is in place under raised floor and connects to the water cooling unit.
- The 3-port supply and return manifold assembly has supply and return water hoses connected, labeled, and placed at floor cutouts for the secondary IOU.

Tools/parts required

- Antistatic smock
- Phillips screwdriver

CAUTION

Wear an antistatic smock throughout the installation to prevent potential damage to microcircuits.

Procedure

- 1. Check that bleed valve in each secondary IOU section is closed, turned fully clockwise.
- 2. Remove floor tiles along logic panel side of secondary IOU.
- 3. Remove retaining screw and lockwasher from bottom front of power distribution box in NIO section of secondary IOU.
- 4. Swing hinged power distribution box outward from secondary IOU to permit access to water supply and return connections.
- 5. Reinstall retaining screw and lockwasher and hand tighten for storage until later use.

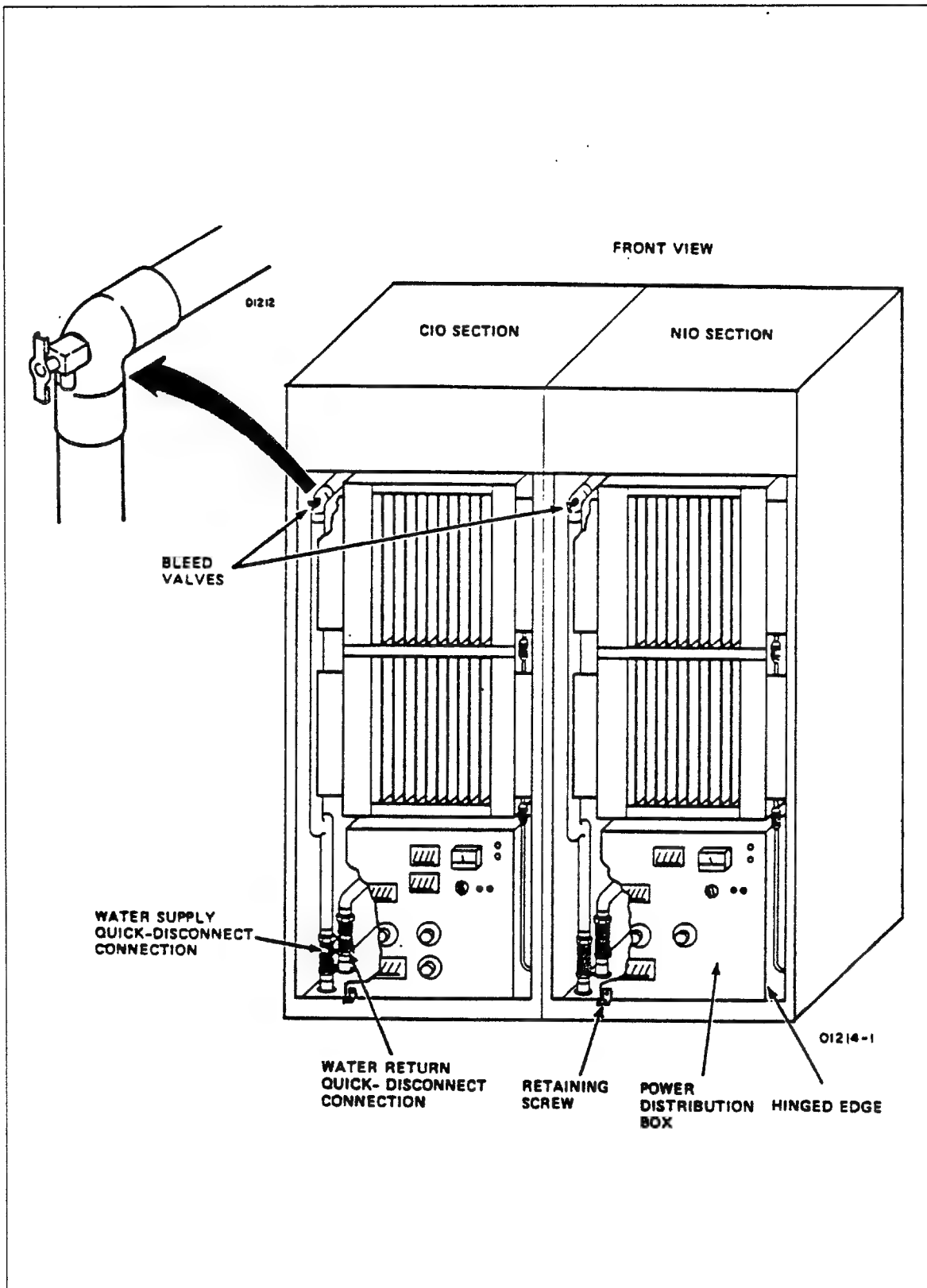


Figure 2-61. Secondary IOU Bleed Valves and Water Connections

Connect 3-Port Manifold Assembly to Secondary IOU

- ___ 6. Locate water supply and return hose ends from 3-port water manifold.
- ___ 7. Pull hose ends up through floor and secondary IOU NIO section cutouts.
- ___ 8. Connect supply and return hoses to supply and return connections in secondary IOU NIO section. Water hoses have quick-disconnect connections with self-sealing valves.
- ___ 9. Open all control valves on used ports on 3-port return manifold assembly. Turn valve handles fully counterclockwise.
- ___ 10. Close valves on unused ports of 3-port manifold.
- ___ 11. Install removed floor tiles only if power connections are completed.
- ___ 12. Swing hinged power distribution box back into cabinet but do not install retaining screws at this time.
- ___ 13. Repeat steps 7 through 12 for CIO section of secondary IOU.

Connect Power

This section contains the procedures necessary to connect power to the secondary IOU.

Power installation prerequisites are:

- 50/60- and 400-Hz power are off.
- Power is available beneath raised floor.
- Preinstallation power inspection is complete and power wiring is correct.

Power installation includes the following tasks:

- Check Power-Off Conditions
- Connect Power to Secondary IOU
 - Check Secondary IOU Blower Motor Voltage Connections
 - Power-Plug Connections to IOU
 - Terminal-Block Connections to IOU

Tools/Parts required for the tasks include the following:

- Antistatic smock
- Phillips screwdriver
- Slotted screwdriver

CAUTION

Wear an antistatic smock throughout the installation to preven potential damage to microcircuits.

NOTE

Connections from an under-floor ground reference grid to EMC GND terminals in the following procedures are unnecessary with the normally-used shielded signal cables that go to and from the IOU and central computer. If a ground reference grid is present, it should be connected to the unit EMC GND terminals. If any peripheral equipment connected to the IOU has unshielded cables, all system components must connect to a ground reference grid. For additional information on this type grounding, refer to EMC Grounding in chapter 4 of the Site Preparation General Information manual.

Check Power-OFF Conditions

Use this procedure to ensure that all power to the secondary IOU is off before making any power wiring connections. Refer to figure 2-62.

WARNING

Power wiring to the secondary IOU contains dangerous voltages that must be shut off before connecting the wiring to the secondary IOU.

- 1. Check that wall-mounted 50/60-Hz circuit breakers that supply power to secondary IOU and to system power monitor are set to OFF.
- 2. Check that wall-mounted 400-Hz circuit breakers for secondary IOU are set to OFF.
- 3. Check that main disconnect circuit breakers on secondary IOU are set to OFF. These circuit breakers are on fronts of power distribution boxes.
- 4. Check that circuit breaker CB3 on mux power supply in IOU NIO section is set to OFF. Switch is located about mid-way on end panel of mux power supply in secondary IOU NIO section of cabinet.

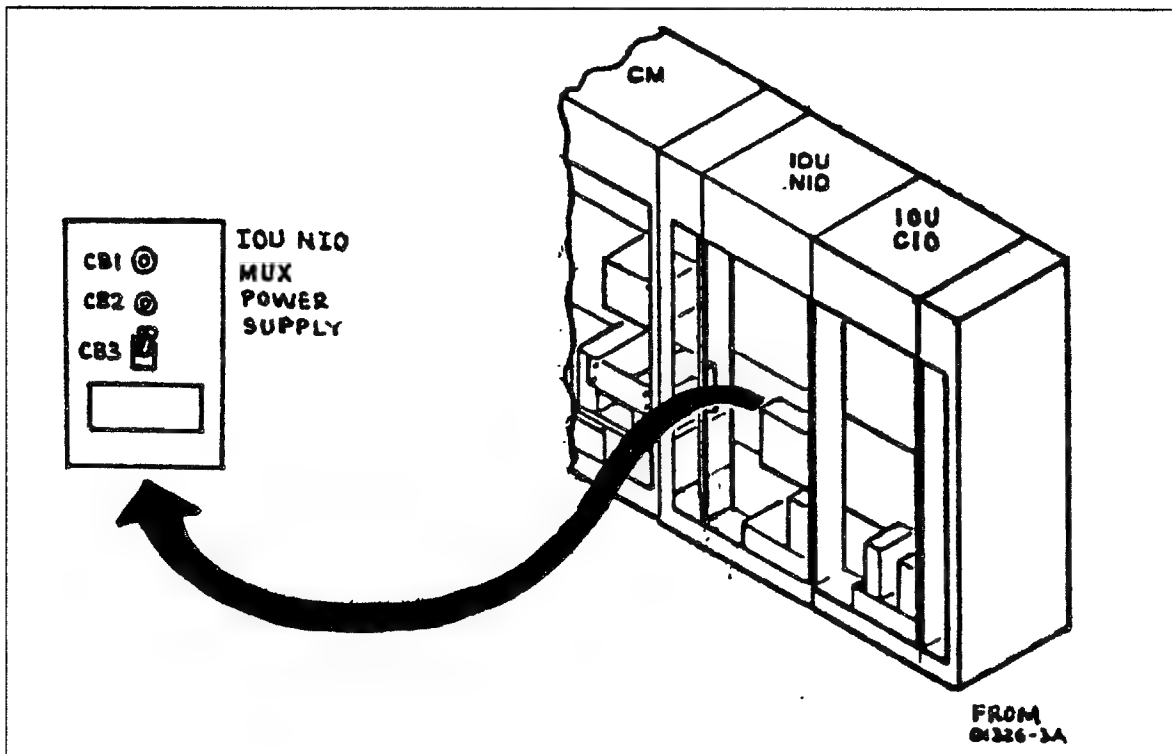


Figure 2-62. IOU NIO Mux Power Supply Panel

Connect Power to Secondary IOU

Power wiring connections to the secondary IOU include 50/60-Hz, single-phase, 120-V utility power and 400-Hz, 3-phase, 120/208-V M-G power. The following procedures describe these connections.

Use the first of the following three procedures to ensure that the wiring connections on the secondary IOU blower motor transformer conform to site power.

Use the second or third procedure to connect 50/60-Hz, 1-phase, 120-V power and 400-Hz, 3-phase, 120/208-V power to both the nonconcurrent input/output (NIO) and the optional concurrent input/output (CIO) sections of the secondary IOU. Follow the procedure that corresponds to the preinstallation preparations for either power-plug or terminal-block power connections.

- Check Secondary IOU Blower Motor Voltage Connections
- Power-Plug Connections to Secondary IOU
- Terminal-Block Connections to Secondary IOU

Check Secondary IOU Blower Motor Voltage Connections

Use this procedure to ensure correct blower motor operation for the site voltage. Refer to figure 2-63.

Procedure prerequisites

- 50/60-Hz power is off.
- 400-Hz power is off.
- Preinstallation power inspection is complete and power wiring is correct.

Tools required

- Phillips screwdriver
- Slotted screwdriver
- Torx screwdriver

Procedure

- 1. Remove retaining screw and lockwasher from left front corner of power distribution box in one section of secondary IOU. This may have been done in a previous procedure.
- 2. Swing power distribution box outward from section.
- 3. Reinstall retaining screw and lockwasher for storage and later use, if not previously done.
- 4. Remove rear ventilated cover.
- 5. Remove terminal strip cover from transformer T5, located at top center of power distribution box.
- 6. Observe that one wire connects to COM terminal and a second wire connects to a terminal that corresponds to site voltage of 120 V, 220 V, 230 V, 240 V, or 250 V.
- 7. Reconnect second wire, if necessary, to a terminal that matches site voltage.
- 8. Install terminal strip cover on T5.
- 9. Install ventilated cover on power distribution box.
- 10. Swing power distribution box into section. Do not install retaining screw at this time.
- 11. Repeat steps 1 through 9 for secondary IOU CIO section.

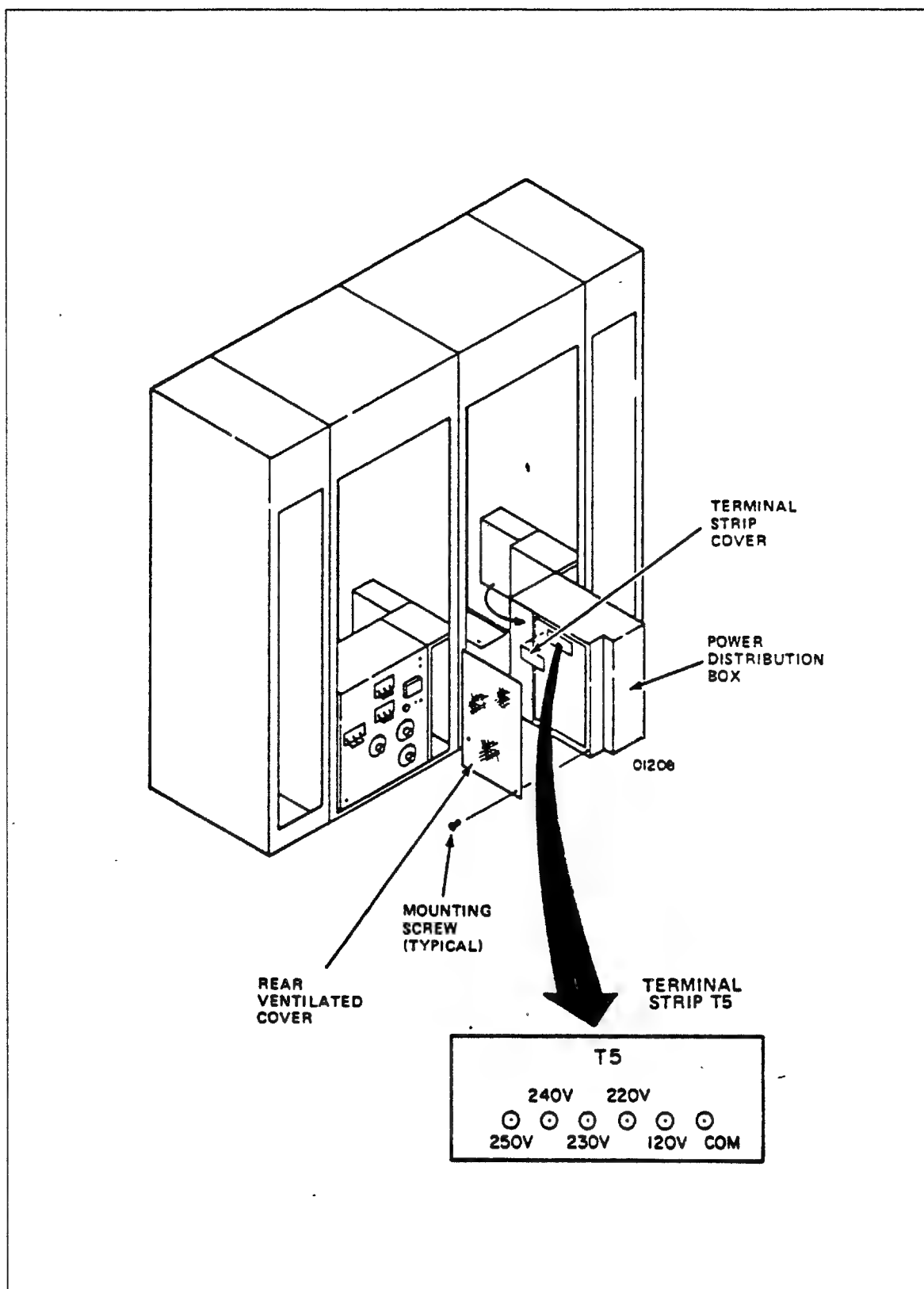


Figure 2-63. IOU Blower Voltage Connections

Power-Plug Connections to Secondary IOU

Use this procedure when the site preinstalled 50/60- and 400-Hz power wiring has pluggable connectors for connection with secondary IOU power cord connectors. The procedure covers one section of the secondary IOU and must be repeated for the second section. Refer to figure 2-64.

Procedure prerequisites

- 50/60-Hz power is off.
- 400-Hz power is off.
- Preinstallation wiring is complete and power wiring is correct.

Tools and parts required

- Phillips screwdriver
- One 2-m (6 ft), 50/60-Hz, 3-phase, power cord for NIO section
- One 2-m (6 ft), 50/60-Hz, 3-phase, power cord for optional CIO section
- One 2-m (6 ft), 400-Hz, 3-phase, power cord for NIO section
- One 2-m (6 ft), 400-Hz, 3-phase, power cord for optional CIO section

Procedure

- 1. Remove retaining screw and lockwasher from left front corner of power distribution box in NIO section. This may have been done in a previous procedure.
- 2. Swing power distribution box outward from section to access power input box.
- 3. Reinstall retaining screw and lockwasher for storage and later use, if not previously done.
- 4. Remove cover from power input box. Cover has four screws.
- 5. Remove floor tiles, as necessary, to place 50/60- and 400-Hz power cords under raised floor in front of power supply.
- 6. Remove retaining ring from strain relief on 400-Hz power cord.
- 7. Pull 400-Hz power cord connector up through cutout in power input box, install retaining ring on strain relief, and connect cord to J2.
- 8. Attach green ground wire to safety ground terminal E3.
- 9. Remove retaining ring from strain relief on 50/60-Hz power cord.
- 10. Pull 50/60-Hz power cord connector up through cutout in power input box, install retaining ring on strain relief, and connect cord to J1.

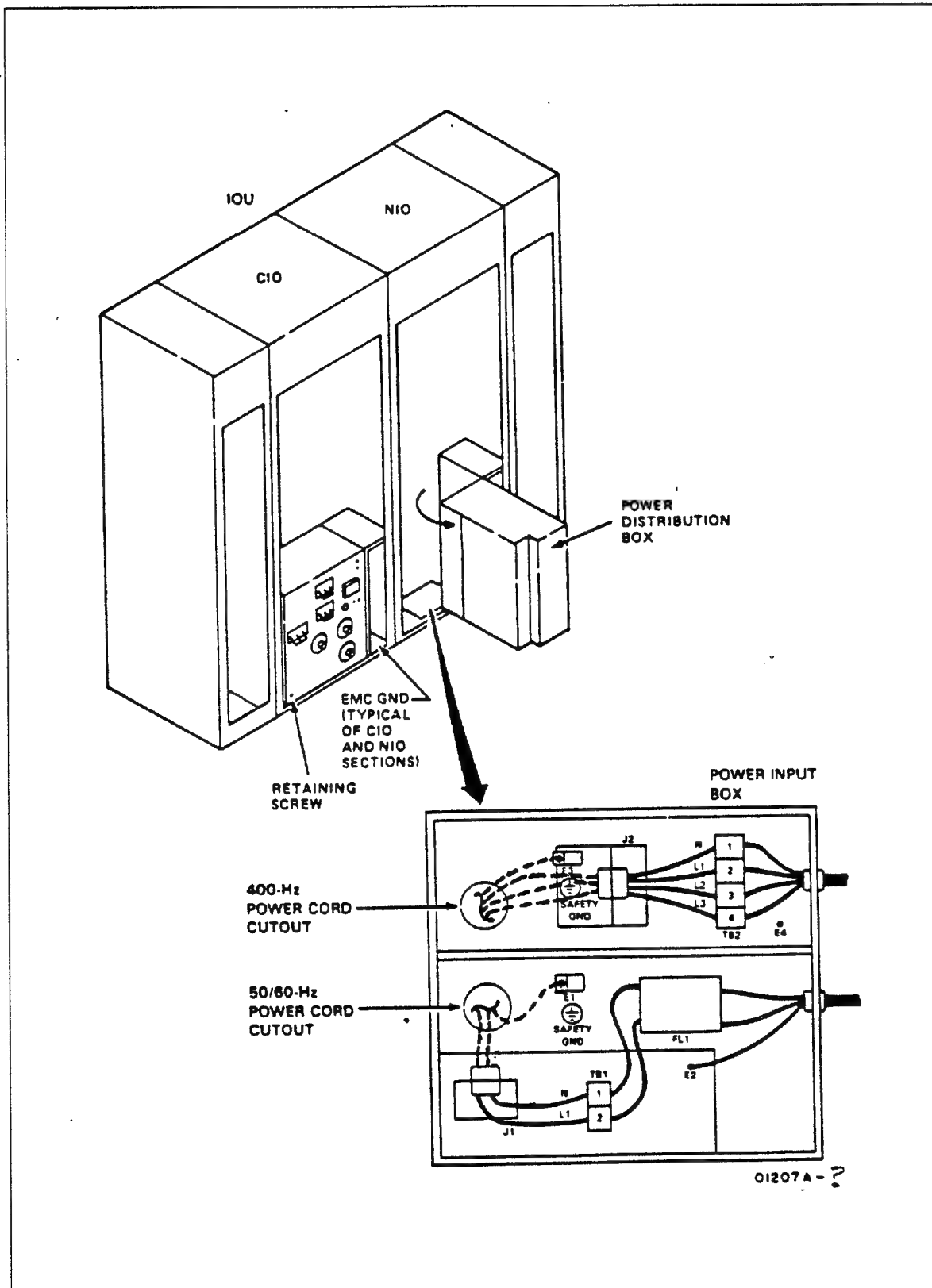


Figure 2-64. Secondary IOU 50/60- and 400-Hz Power Connections

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- ___ 11. Connect braided ground strap from EMC GND terminal to customer-provided on raised-floor grid. (This connection is optional. Refer to note at beginning of power connection procedures.) If braided ground strap is not used but is connected to EMC GND terminal, disconnect strap from terminal and store it at site.
- ___ 12. Attach green ground wire to safety ground terminal E1.
- ___ 13. Connect 50/60- and 400-Hz power cord connectors under raised floor to site power connectors.
- ___ 14. Install cover on power input box.
- ___ 15. Swing power distribution box into section. Do not fasten with retaining screw at this time.
- ___ 16. Repeat procedure with CIO section.
- ___ 17. Install floor tiles if water hose connections to secondary IOU are complete.

Terminal-Block Connections to Secondary IOU

Use this procedure when the site preinstalled 50/60- and 400-Hz power wiring has wires that will connect directly to terminal blocks in the secondary IOU. This procedure covers the NIO section of the secondary IOU and must be repeated for the CIO section. Refer to figures 2-65 and 2-66.

Procedure prerequisites

- 50/60-Hz power is off.
- 400-Hz power is off.
- Preinstallation power inspection is complete and power wiring is correct.

Tools required

- Phillips screwdriver
- Slotted screwdriver

Procedure

NOTE

A licensed electrician must connect the power wiring under the supervision of a Control Data customer engineer and follow all local codes.

- 1. Remove retaining screw and lockwasher from left front corner of power distribution box in NIO section. This may have been done in a previous procedure.
- 2. Swing power distribution box outward from section to access power input box.
- 3. Reinstall retaining screw for storage and later use, if not previously done.
- 4. Remove cover from power distribution box. Cover has four screws.
- 5. Cut wires from connectors J1 and J2 in power input box.
- 6. Loosen terminals on TB1 and TB2 and remove cut wires only. Do not remove any other wires.

NOTE

Do not remove power connectors J1 and J2 from their brackets.

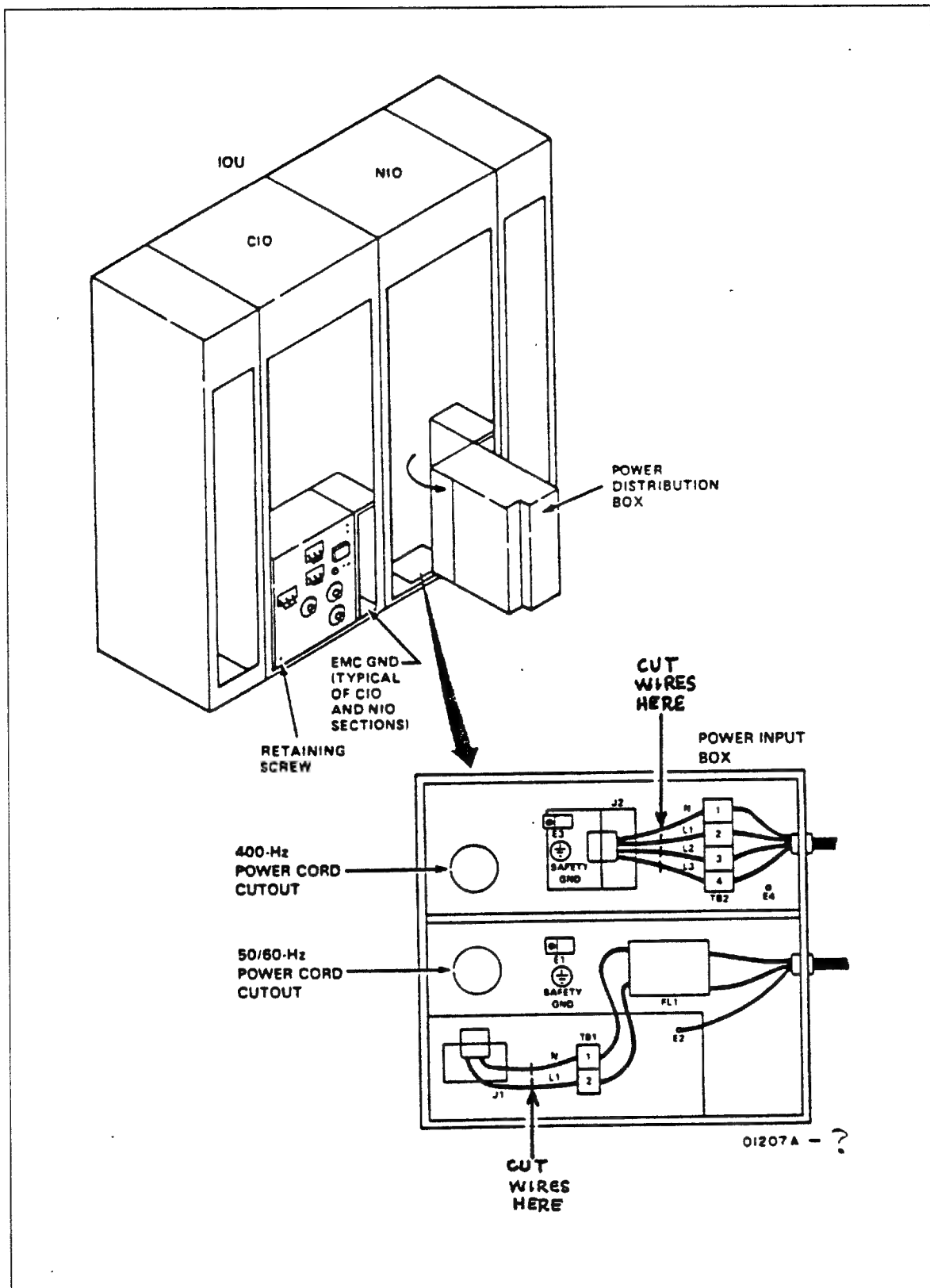


Figure 2-65. Secondary IOU 50/60- and 400-Hz Power Connections

- ___ 7. Remove floor tiles in front of IOU NIO power distribution box.
- ___ 8. Remove retaining ring from strain relief on preinstalled 400-Hz power wires.
- ___ 9. Pull power wires up through cutout into power input box to TB2.
- ___ 10. Install retaining ring on strain relief for wires pulled up in step 9.
- ___ 11. Remove retaining ring from strain relief on preinstalled 50/60-Hz power wires.
- ___ 12. Pull power wires up through cutout in power input box to TB1.
- ___ 13. Install retaining ring on strain relief for wires pulled up in step 13.
- ___ 14. Connect 400-Hz wires to TB2 as follows:
 - White to TB2-1
 - Black to TB2-2
 - Red to TB2-3
 - Orange to TB2-4
- ___ 15. Connect 400-Hz safety ground wire to E3.
- ___ 16. Connect 50/60-Hz wires to TB1.
 - White to TB1-1
 - Black to TB1-2
- ___ 17. Connect braided ground strap from EMC GND terminal to customer-provided terminal on raised-floor grid. (This connection is optional. Refer to note at beginning of power connection procedures.) If braided ground strap is not used but is connected to EMC GND terminal, disconnect strap from terminal and store it at site.
- ___ 18. Connect 50/60-Hz safety ground wire to E1.
- ___ 19. Install cover on power input box.
- ___ 20. Swing power distribution box into NIO section. Do not fasten with retaining screw at this time.
- ___ 21. Repeat this procedure for CIO section.
- ___ 22. Install floor tiles if water hose connections to primary IOU are complete.

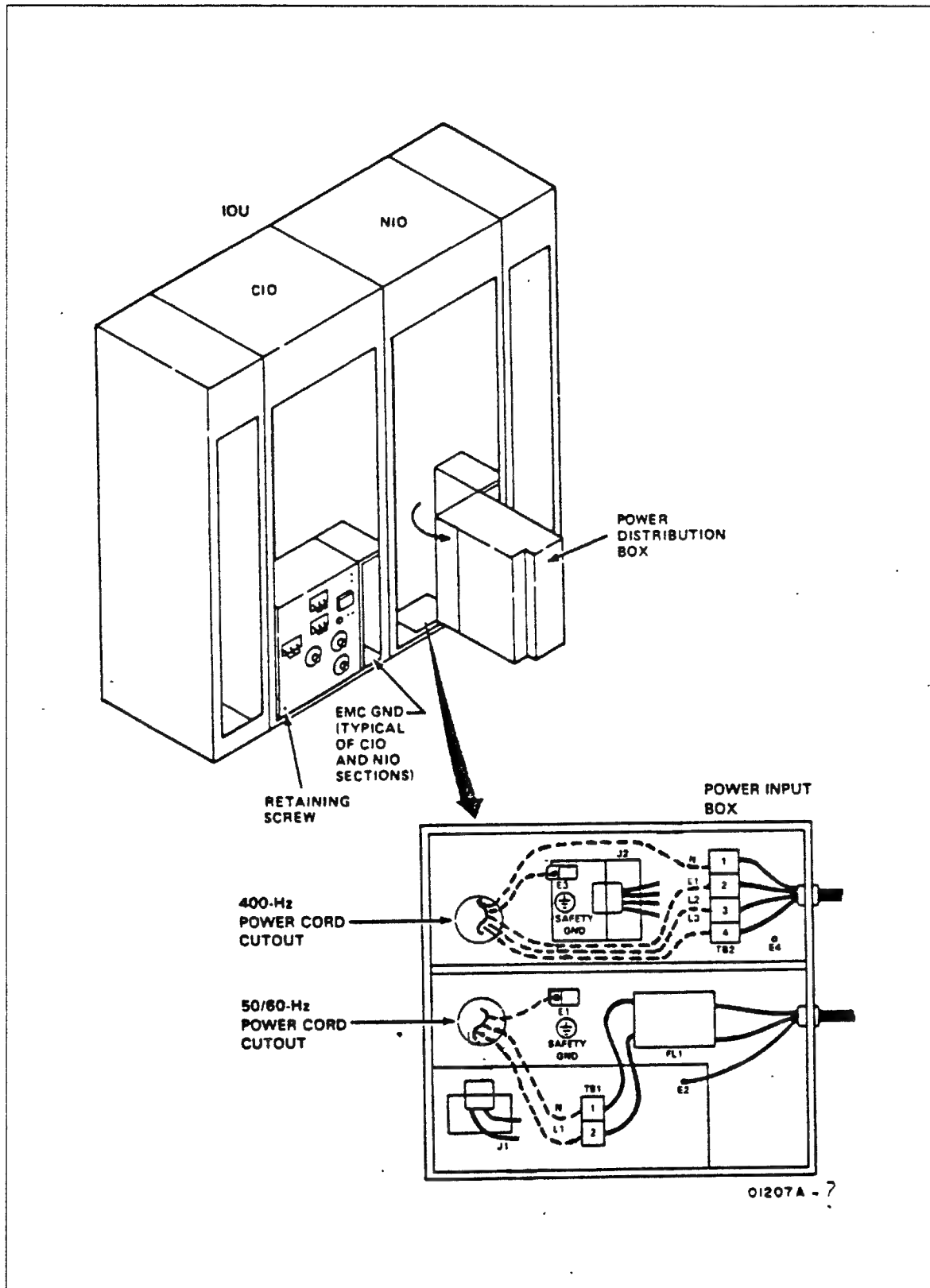


Figure 2-66. Secondary IOU 50/60- and 400-Hz Power Connections

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Connect Secondary IOU Cables

This section contains the procedures necessary to connect cables to the secondary IOU.

Cabling prerequisites are:

- Unit installation is complete and unit power is off

Cabling installation includes the following tasks:

- Connect Secondary IOU Data Cables
- Connect Secondary IOU Fault Sense Cables
- Connect I/O Cables to Secondary IOU With CP-1 Present (to be supplied)
- Connect Secondary IOU Clock Cables
- Connect CC596-A System Console Cables
- Connect Channel Cables to NIO Section
- Connect Channel Cables to CIO Section

Tools/Parts required for the tasks include the following:

- Antistatic smock
- Antistatic wrist strap
- Diagonal cutter or knife
- Phillips screwdriver
- Slotted screwdriver
- Cable ties

CAUTION

Wear an antistatic smock throughout the installation to prevent damage to microcircuits. Also, wear and use an antistatic wrist strap when connecting all cables to prevent damage to microcircuits.

Use care in handling and connecting all cables to prevent damage to the cable connections on the connectors and the connector pins and jacks.

Connect Secondary IOU Data Cables

Use this procedure to connect the data cables between the secondary IOU NIO and the interbay cabinet of the primary system. Refer to figures 2-67, 2-68, and 2-69.

NOTE

IS CP-1 PRESENT?

- *If yes, go to next procedure.*
 - *If no, continue.*
-

Procedure prerequisites

- 50/60-Hz power is OFF
- 400-Hz power is OFF,

Tools/parts required

- Anti-static smock and wrist strap
- Allen wrench
- Seven ECS I/O cable assemblies (P/N 24614883)

Procedure

- 1. Remove 22 screws, lockwashers and flatwashers that secure interbay inner panel to interbay.
- 2. Remove four screws that secure side cover to I/O interface box and remove side cover.
- 3. Rotate captive Allen-head fasteners on Interbay I/O panel to release I/O panel from I/O interface box using 1/8-in Allen wrench.
- 4. Locate the seven Secondary IOU data cable assemblies.

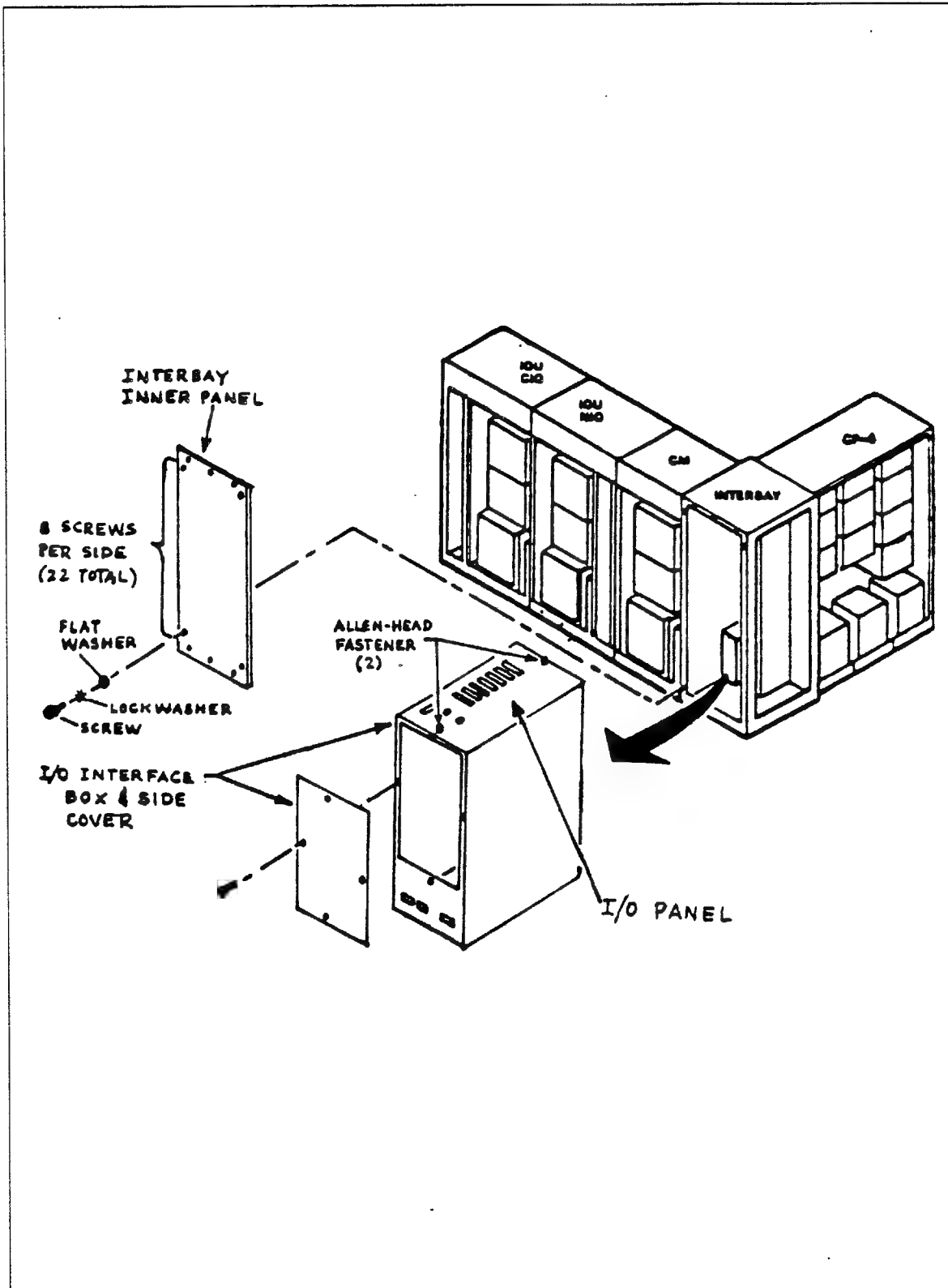


Figure 2-67. Removing Interbay Inner Panel and I/O Interface Cover

- 5. If not labeled, label connectors on cable assemblies as follows:

ECS IO Panel Connector	Mates With CMC AUX Port Connector
J30	C0
J31	C1
J32	C2
J33	C3
J34	C4
J35	C5
J36	C6

- 6. Using the coiled cable provided, connect cable to wrist strap and connect free end of cable to ground.
- 7. Feed secondary IOU connectors, with their cables, through I/O interface box and cable cutout beneath I/O interface box to floor. Retain about 2 feet of each cable with I/O panel connector and lay them in interbay.

NOTE

The procedure of step 8 is easier if you begin the connection process with J36. Also, due to the weight of the I/O panel with cables already attached to its top side, may necessitate tying the panel in a raised position to mate connectors to its underside.

- 8. Reach into I/O interface box and lifting I/O panel up from I/O Interface box, mate C6 cable assembly connector to J36 on the underside of I/O panel (see figure).
- 9. Continue mating connectors with J35 next and so on until completing procedure with J30.
- 10. Carefully position Interbay I/O panel over I/O Interface box opening and rotate Allen-head fasteners 90 degrees to secure panel to box.

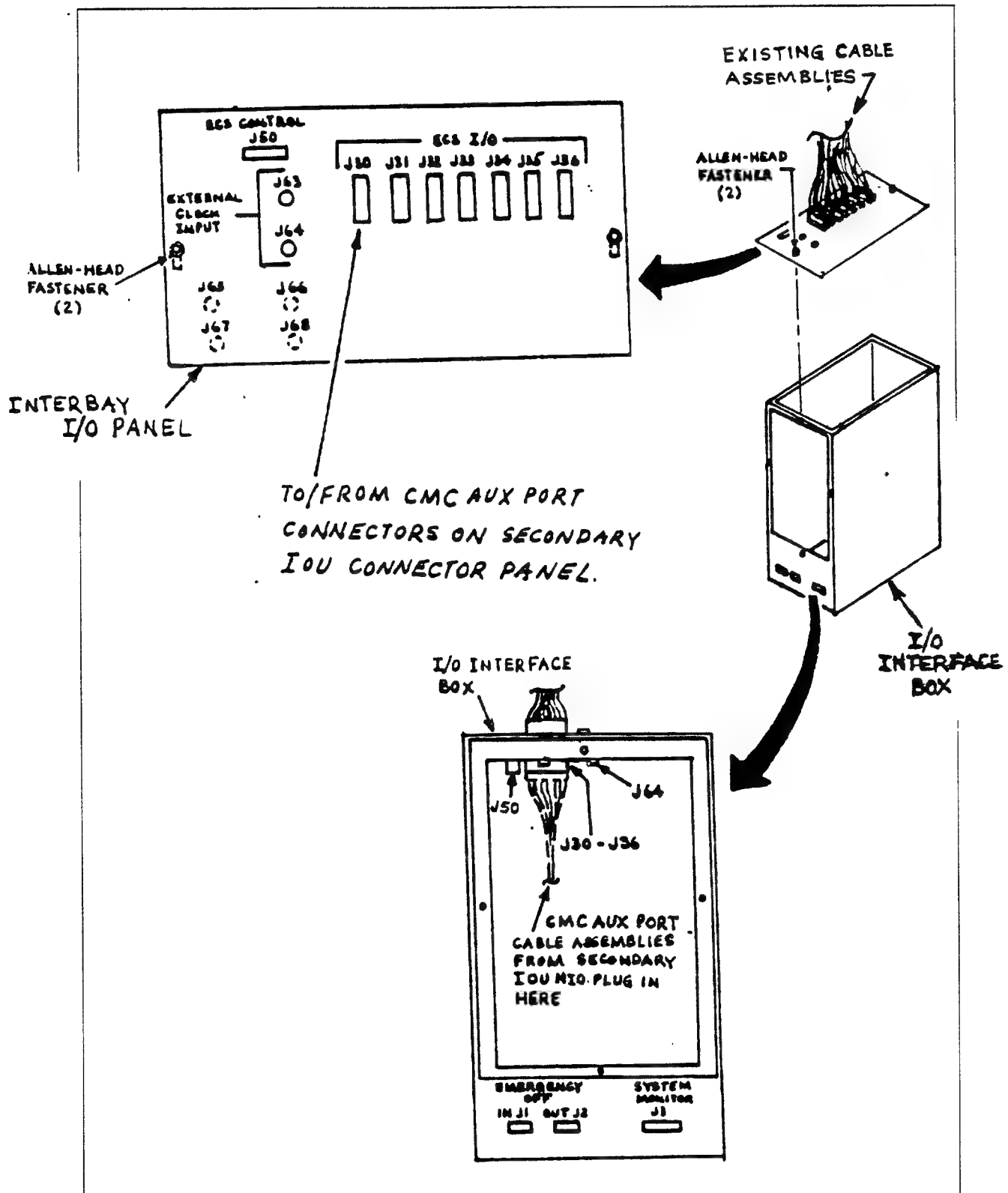


Figure 2-68. Connecting Secondary IOU Data Cables to Interbay I/O Panel

Connect Secondary IOU Data Cables

- 11. Route cable assemblies with connectors marked C0 through C6 under floor to secondary IOU NIO cabinet.
- 12. Pull cables up through cable cutout of secondary IOU NIO cabinet and mate connectors as labeled, with CMC AUX PORT connectors C0 through C6 on secondary IOU connector panel (see figure).

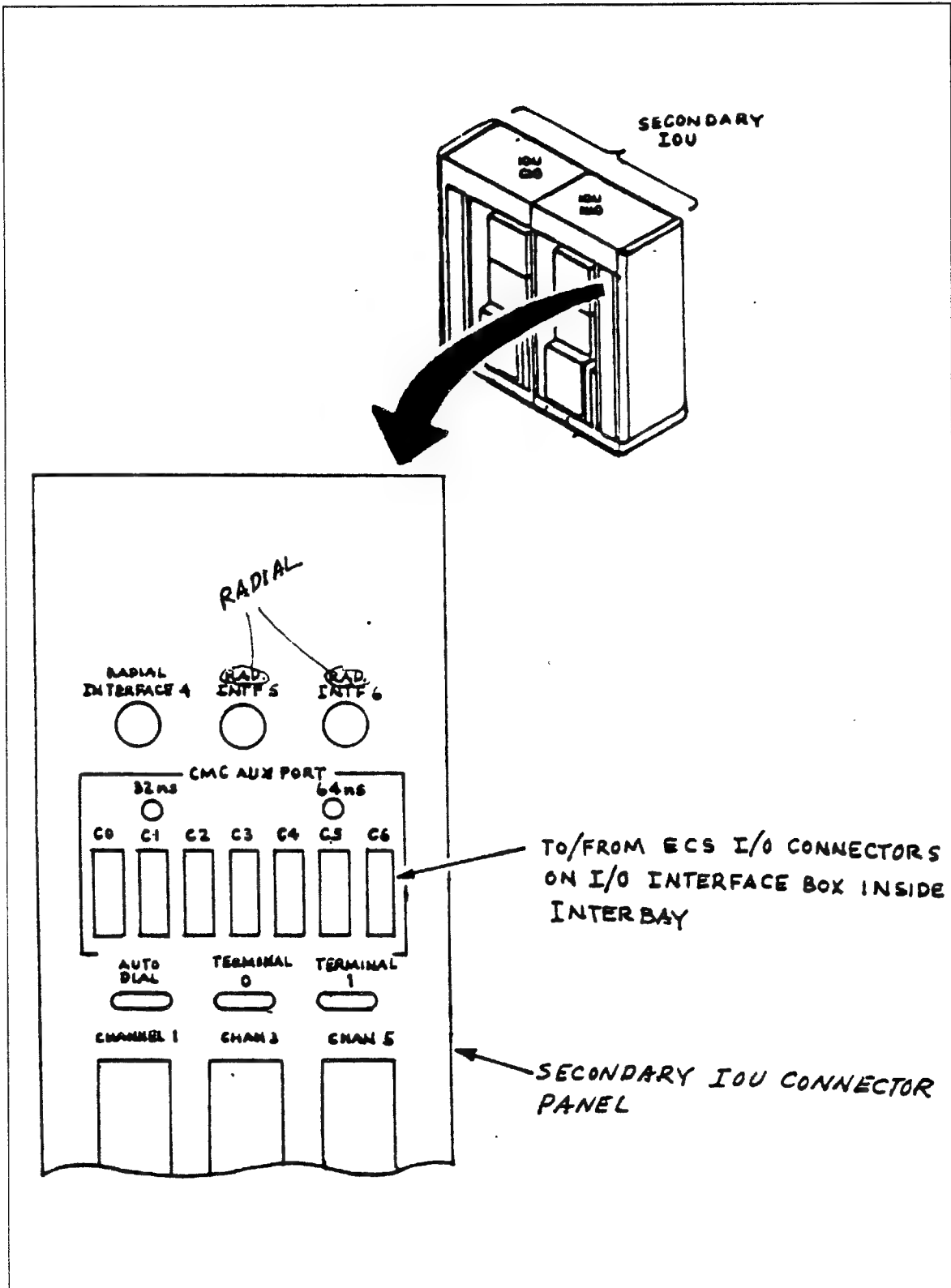


Figure 2-69. Connecting Secondary IOU Cables to IOU CIO Connector Panel

Connect Secondary IOU Fault Sense Cables

Use this procedure to route and connect the fault sense cables from the secondary IOU to connectors on the cover assembly on the I/O interface box within the interbay cabinet. Refer to figures 2-70 and 2-71.

Procedure prerequisites

- Secondary IOU is in place.
- Interbay inner panel is removed
- I/O interface box side cover is removed

Tools/parts required

- Antistatic wrist strap
- Phillips screwdriver
- Warning connector panel assembly, p/n 10283517

Procedure:

CAUTION

Use an antistatic wrist strap when connecting or disconnecting cables to prevent damage to microcircuits. Also, use care when handling cables to prevent damage to cable connections and to connector pins and jacks.

- 1. Disconnect cables and connectors presently connected to J1, J2 and J3 from existing I/O interface box. Labeling on box is EMERGENCY OFF (IN J1 and OUT J2), and SYSTEM MONITOR J3.
- 2. Remove attaching hardware that secures connectors J1, J2, and J3 from I/O interface box. Save attaching hardware.
- 3. Install J1, J2, and J3 on I/O box side cover of new warning connector panel assembly (p/n 10283517) in spaces provided (below holes for connectors J4 and J5) using attaching hardware saved previously.
- 4. Reconnect cable and connectors removed in step 1 to J1, J2, and J3 now mounted on new I/O box side cover.
- 5. Locate two fault sense cables coiled in bottom of secondary IOU cabinet.
- 6. Cut cable ties from cables, if not previously cut.
- 7. Label one cable NIO J15 at one end, P4 at other end.
- 8. Label second cable CIO J15 at one end, P5 at other end.
- 9. Install connectors P4 and P5 into J4 and J5 holes in new I/O box side cover. Secure connectors with attaching hardware provided.
- 10. Connect P4 to J4 and P5 to J5 on new I/O box side cover within interbay cabinet.
- 11. Install I/O box side cover on I/O interface box with screws removed in an earlier procedure.

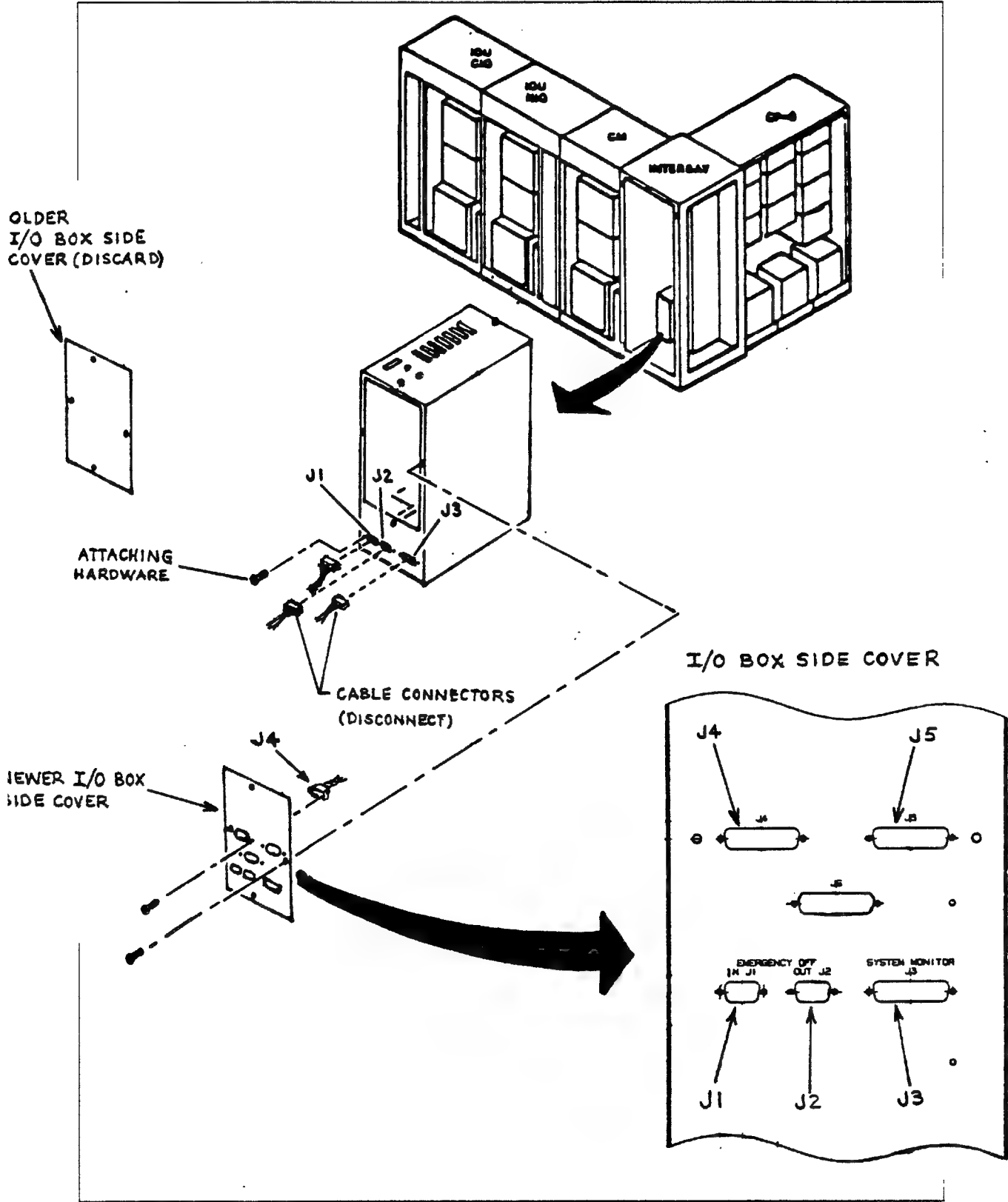


Figure 2-70. Installing Fault Sense Connectors

- ___ 12. Remove floor tiles as necessary to permit routing of cables beneath raised floor from interbay cabinet to secondary IOU.
- ___ 13. Pull up cables through floor cutouts in bottoms of both secondary IOU cabinets.
- ___ 14. Connect CIO P15 to J15 on secondary CIO lower connector panel next to power distribution box.
- ___ 15. Connect NIO P15 to J15 on secondary NIO lower connector panel next to power distribution box.
- ___ 16. Do not replace floor tiles at this time.

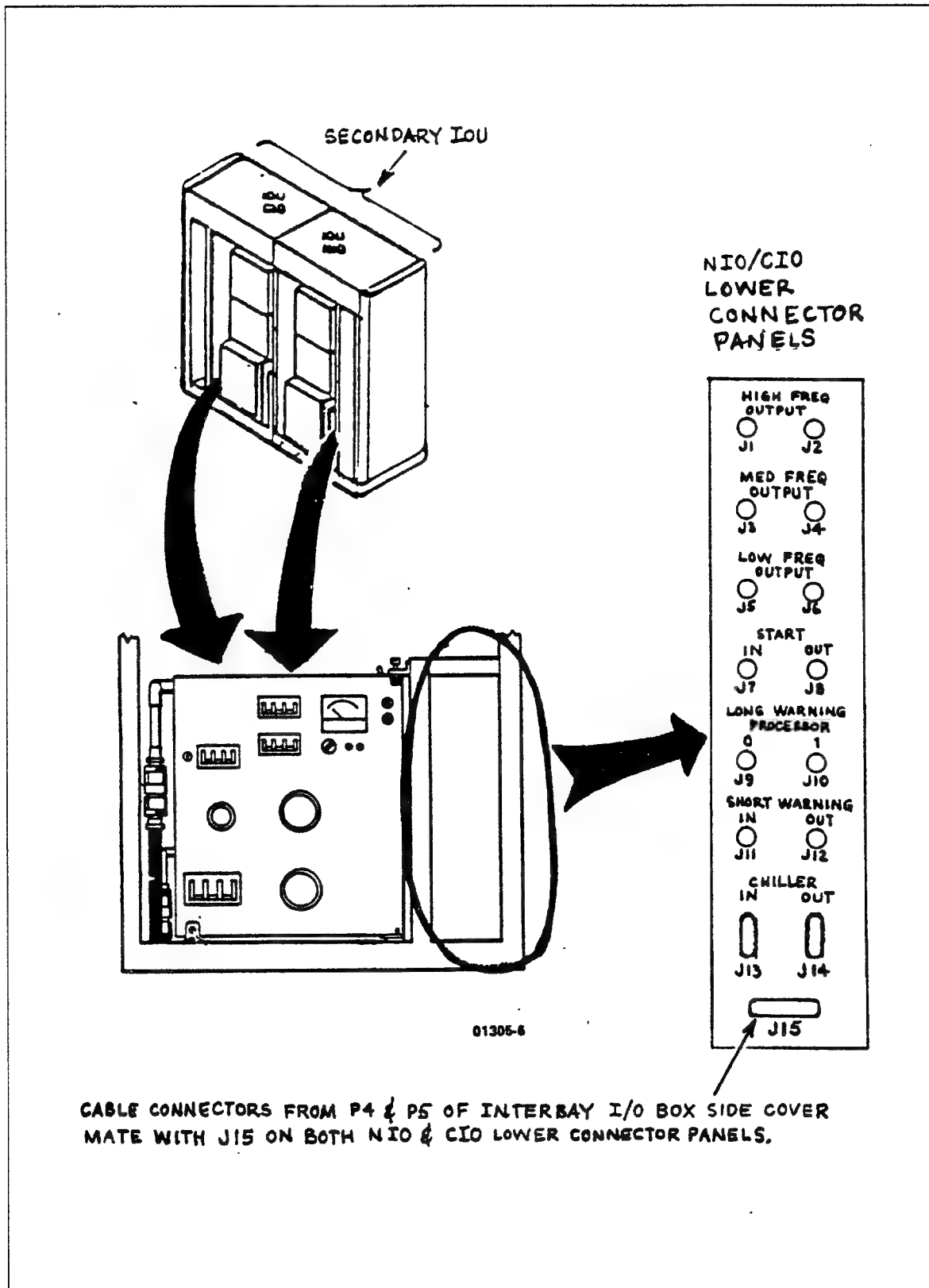


Figure 2-71. Connecting Fault Sense Connectors

Connect I/O Cables to Secondary IOU With CP-1 Present

Connect I/O Cables to Secondary IOU With CP-1 Present

Text to be supplied

Figure to be supplied

Figure 2-72. Removing CP-1 and Interbay Inner Panel

Connect I/O Cables to Secondary IOU With CP-1 Present

Text to be supplied

Text to be supplied

Connect I/O Cables to Secondary IOU With CP-1 Present

Text to be supplied.

Figure to be supplied

Figure 2-73. Connecting Secondary IOU Cables to Interbay I/O Panel

Connect Secondary IOU Clock Cables

Use this procedure to route and connect clock cables between the BS213-A CM and the secondary IOU CIO. See figure 2-74.

Procedure prerequisites

- 50/60-Hz power is off
- 400-Hz power is off
- Secondary IOU is in place

Tools/parts required

- Two clock cable assemblies (P/N 53812036)

Procedure

1. Locate and mark (if not marked) connectors of both clock cable assemblies and route them under floor between CM and secondary IOU CIO.
2. Pull up connector of one cable assembly through cable cutout in floor beneath CM. Mate connector marked J5 with LOW FREQ OUTPUT connector on CM clock connector panel.
3. Pull up other cable and connector marked J3 through cutout in floor beneath CM. Mate its connector with MED FREQ OUTPUT connector (J3) on CM clock connector panel.
4. At secondary IOU CIO, pull up cables and connectors through cable cutout in floor beneath secondary IOU CIO.
5. Mate connector labeled 32ns with 32ns connector and mate connector of second cable with 64ns connector on secondary IOU CIO connector panel.
6. Verify that connectors are connected as follows:

Connector on Secondary IOU CIO Connector Panel	Mates with Connector on CM Clock Connector Panel
32ns	LOW FREQ OUTPUT - J5
64ns	MED FREQ OUTPUT - J3

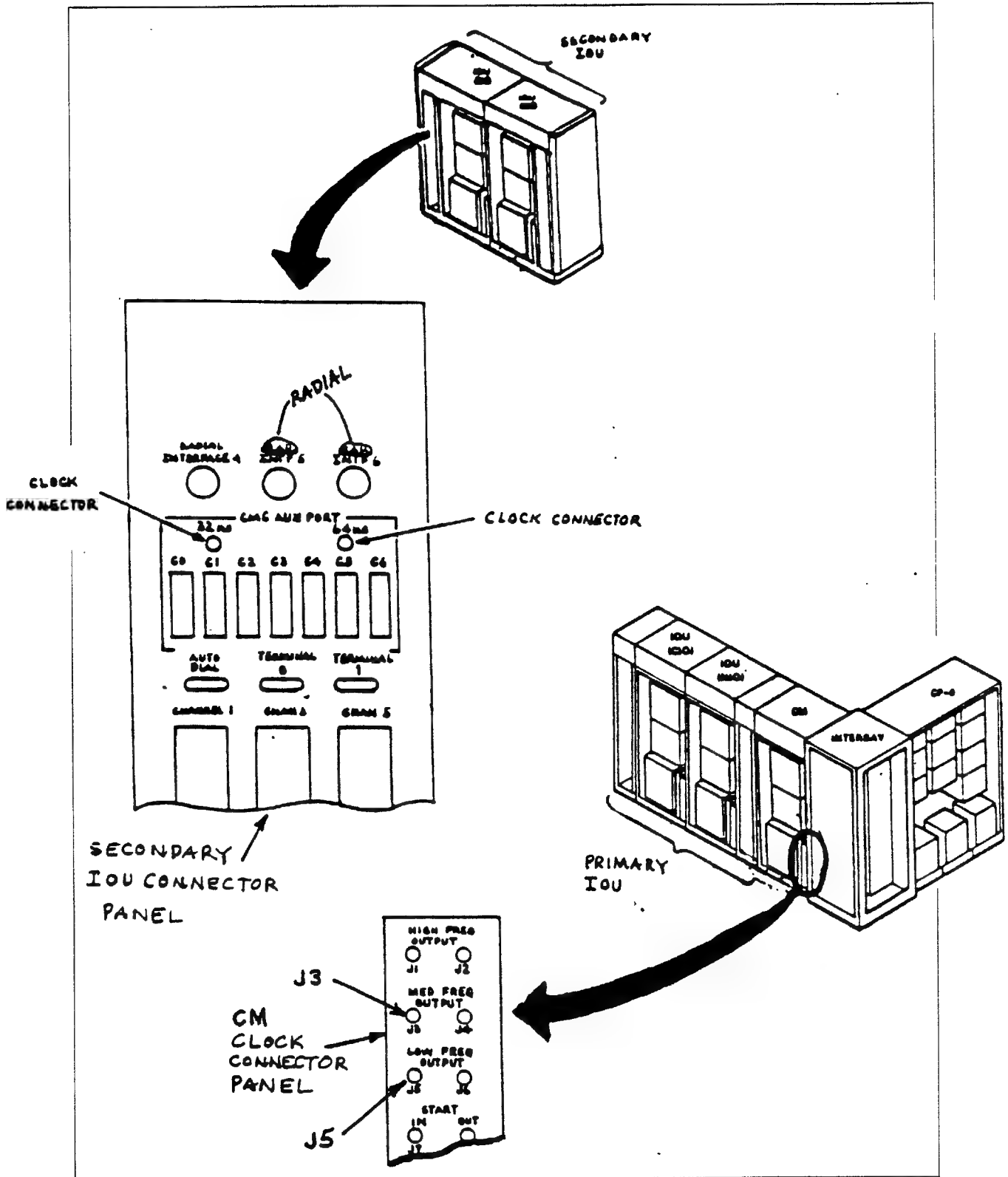


Figure 2-74. Connecting Clock Cables

Connect CC596-A System Console Cables

Use this procedure to connect cables between the CC596-A PC console Hostess 8-port board and the primary and secondary NIO connector panels. Refer to figure 2-75.

Procedure prerequisite

- 50/60- and 400-Hz power to PC, primary, and secondary IOU are off

Tools and materials required

- Two PC console cables, p/n 19268593

Procedure

1. Locate and mark three interconnecting cables as follows:

PC Hostess 8-Port Bd.	IOU/NIO Connector Panel
6	Terminal 1 (primary NIO)
7	Terminal 0 (secondary NIO)
8	Terminal 0 (primary NIO)

2. Remove floor tiles as necessary to permit routing cables from primary and secondary IOU, beneath raised floor, to PC console.
3. Route two PC/primary NIO cables beneath raised floor to primary IOU.
4. Route two cables up through cutout in raised floor and cutout in bottom of primary IOU NIO cabinet.
5. Connect antistatic wrist strap to primary IOU frame ground.
6. Connect cable from Hostess port 8 to primary NIO terminal 0, and cable from Hostess port 7 to secondary NIO terminal 0.
7. Route one PC/secondary CIO cables beneath raised floor to secondary IOU. Remove floor tiles as necessary.
8. Route two cables up through cutout in raised floor and cutout in bottom of secondary IOU NIO cabinet.
9. Connect antistatic wrist strap to secondary IOU frame ground.
10. Connect cable from Hostess port 6 to primary NIO terminal 0.
11. Replace floor tiles.

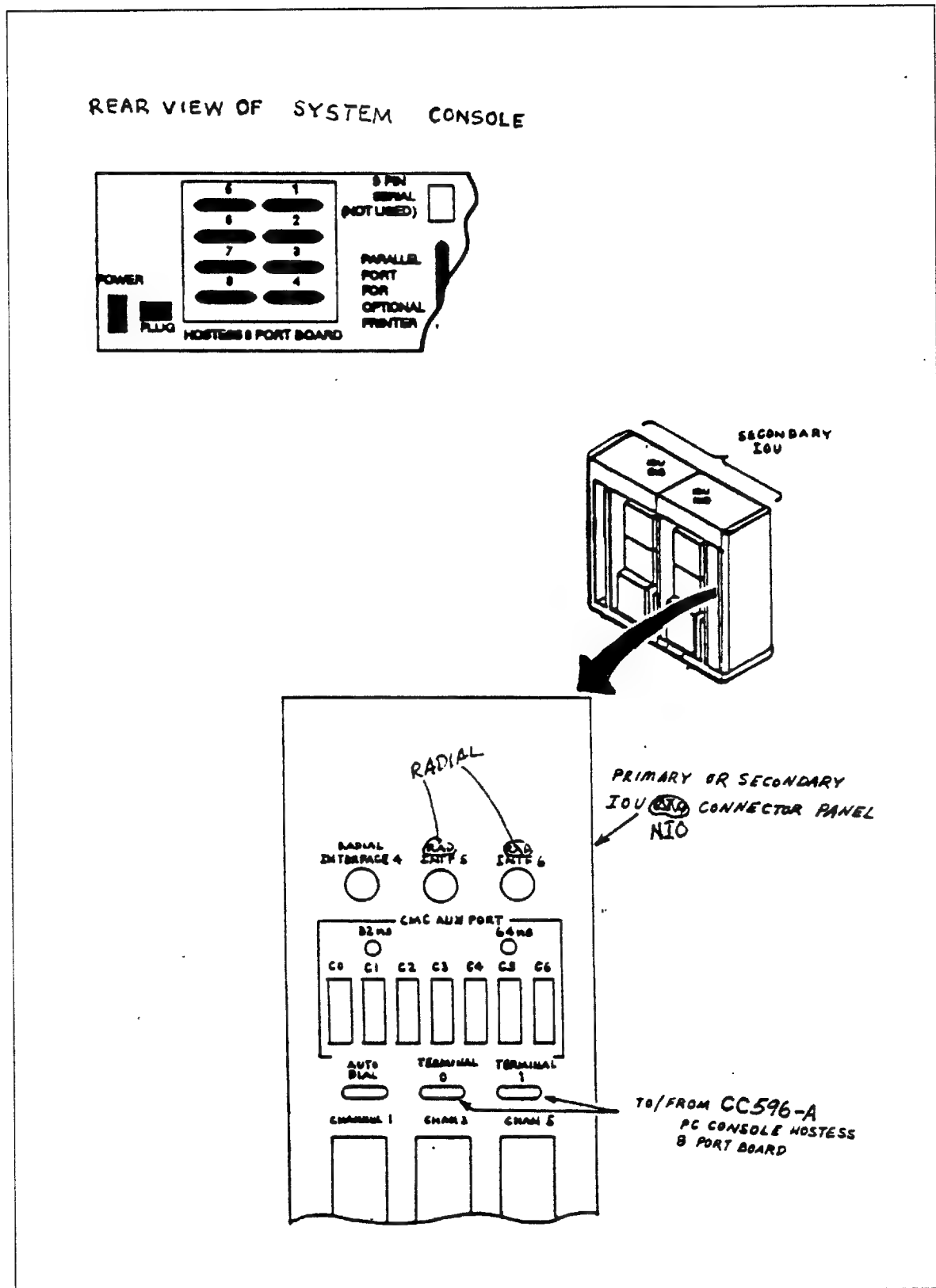


Figure 2-75. Connecting System Console Cables to IOU/NIO Connector Panel

Connect Channel Cables to NIO Section

Use this procedure to connect channel cables to the cable connector panel in the NIO section of the secondary IOU and to record the connections for future reference. Refer to figure 2-76.

Procedure prerequisite

- Secondary IOU is in place.

Procedure

NOTE

Channels 4, 6, 22, 24, 30, and 32 have factory-installed terminators. If any of these channels are not used, the terminators must be left installed. If a channel is used, remove the terminator and store in the bottom of the NIO cabinet.

1. Connect channel cables to NIO section cable connector panel in bottom to top order. This order allows greatest accessibility to cable connectors on panel.
2. Record channel cable connections in table 2-6 for future reference.

Table 2-6. NIO Channel Cable Connectors

Connector Panel Designators	Peripheral Equipment	Connector Panel Designators	Peripheral Equipment
CHANNEL 0		CHANNEL 1	
CHANNEL 2		CHANNEL 3	
CHANNEL 4 ¹		CHANNEL 5	
CHANNEL 6 ¹		CHANNEL 7	
CHANNEL 10		CHANNEL 11	
CHANNEL 12		CHANNEL 13	
CHANNEL 20		CHANNEL 21	
CHANNEL 22 ¹		CHANNEL 23	
CHANNEL 24 ¹		CHANNEL 25	
CHANNEL 26		CHANNEL 27	
CHANNEL 30 ¹		CHANNEL 31	
CHANNEL 32 ¹		CHANNEL 33	

Note:

1. Remove terminator from channel if channel is used. If channel is not used, leave terminator installed.

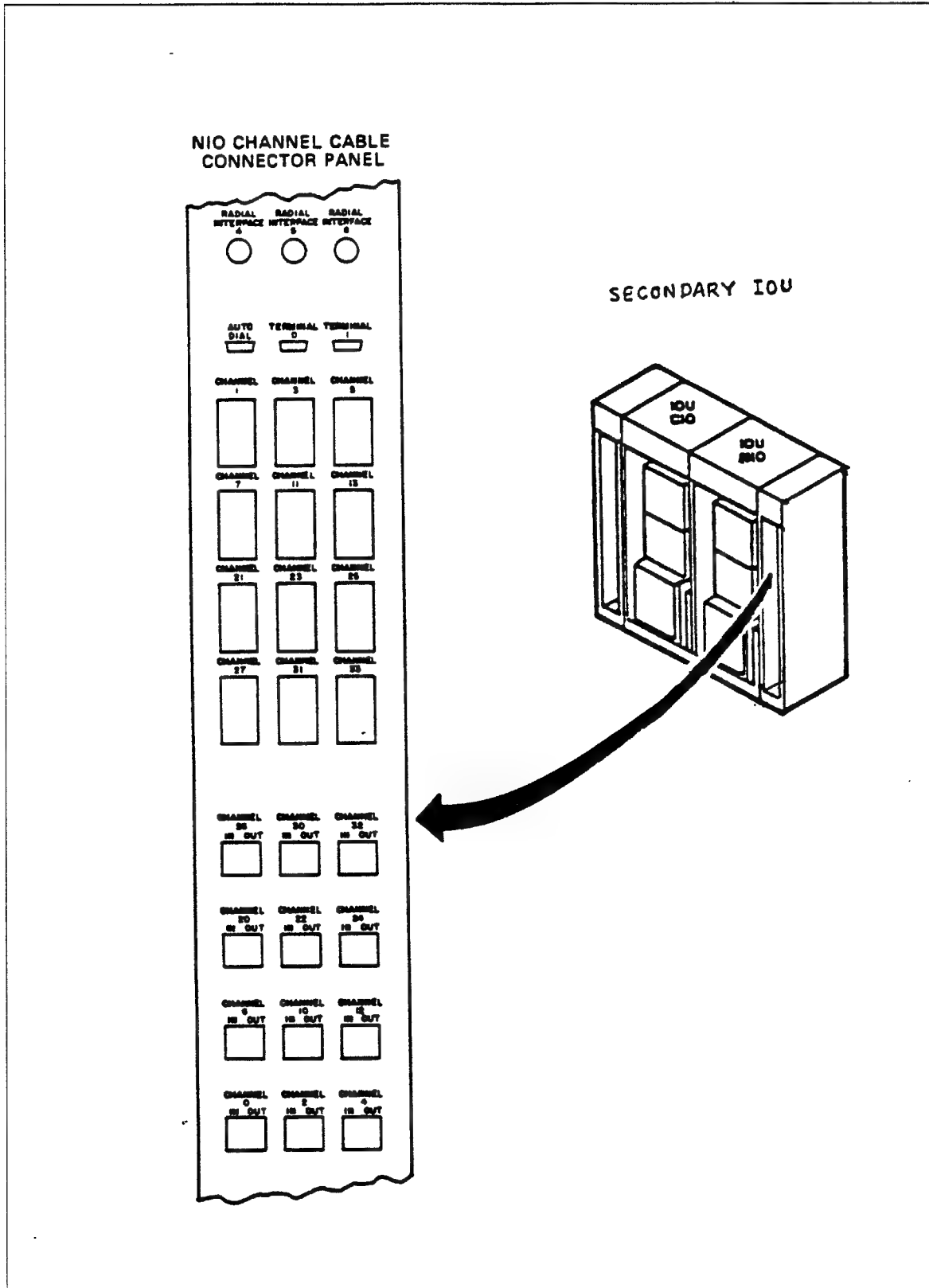


Figure 2-76. NIO Cable Connector Panel

Connect Channel Cable to CIO Section

Use this procedure to connect channel cables to the cable connector panel in the CIO section of the secondary IOU and to record the connections for future reference. Refer to figure 2-77.

Prerequisite

- Secondary IOU is in place.

Procedure

1. Connect channel cables to CIO cable connector panel (figure 2-xx) in bottom to top order. This order allows greatest accessibility to cable connectors on panel.
2. Record channel cable connections in table 2-7 for future reference.

Table 2-7. CIO Channel Cable Connectors

Connector Panel Designators	Peripheral Equipment	Connector Panel Designators	Peripheral Equipment
CHANNEL 0-A		CHANNEL 5-A	
CHANNEL 0-B		CHANNEL 5-B	
CHANNEL 1-A		CHANNEL 6-A	
CHANNEL 1-B		CHANNEL 6-B	
CHANNEL 2-A		CHANNEL 7-A	
CHANNEL 2-B		CHANNEL 7-B	
CHANNEL 3-A		CHANNEL 10-A	
CHANNEL 3-B		CHANNEL 10-B	
CHANNEL 4-A		CHANNEL 11-A	
CHANNEL 4-B		CHANNEL 11-B	

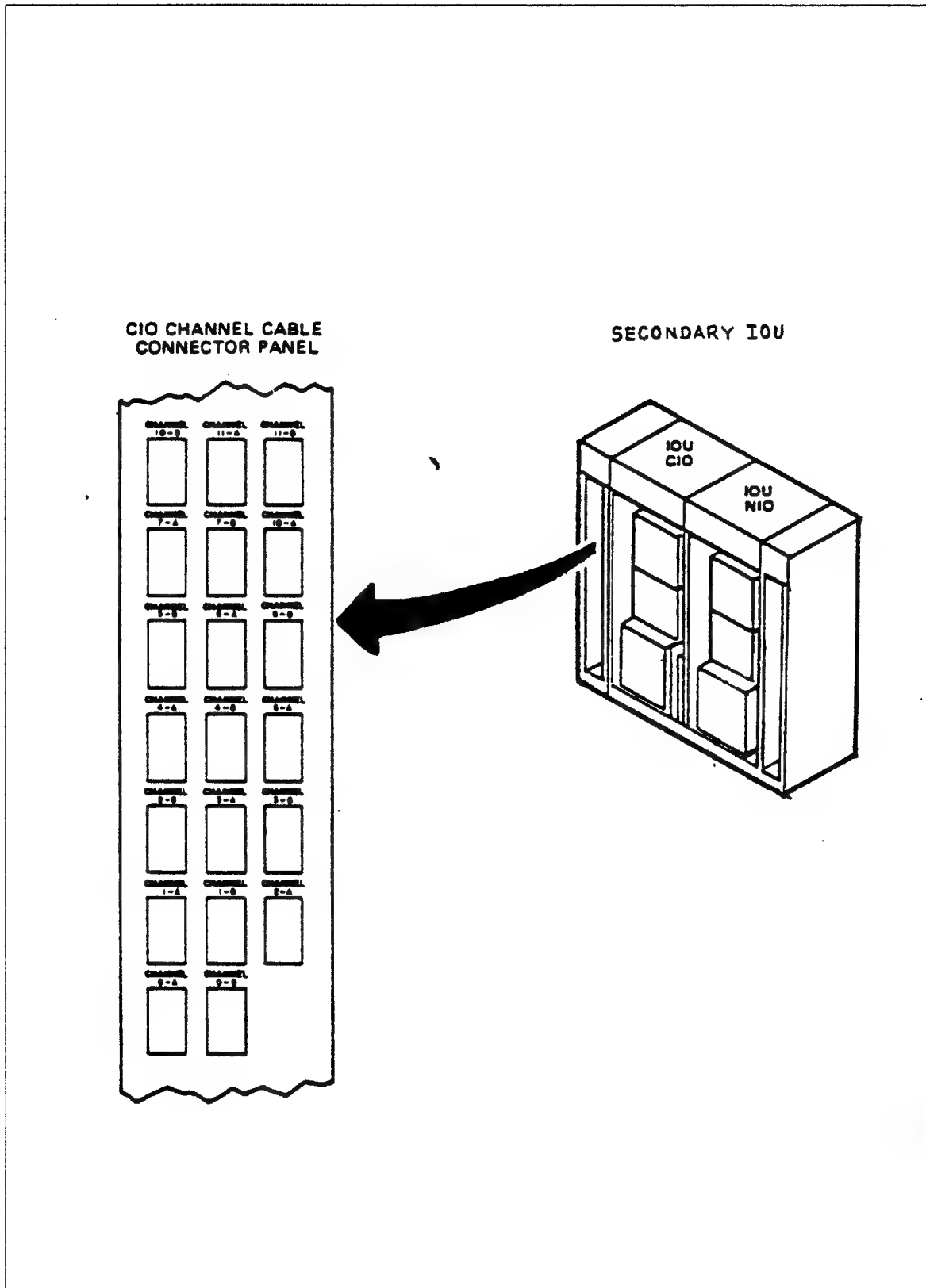


Figure 2-77. CIO Cable Connector Panel

To present the information in this chapter in a structured format, this page has been left blank.

Final Secondary IOU Procedures

Final procedures to be performed on the secondary IOU consist of the following:

- Install EPROMs in Primary IOU NIO
- ~~Apply System Power~~
- ~~Apply M-G Set Power From SPDP (845/855 System Only)~~
- ~~Apply M-G Set Power From SRM~~
- ~~Apply Power and Adjust Voltages for IOU NIO Cabinet~~
- ~~Apply Power and Adjust Voltages for IOU CIO Cabinet~~
- ~~Bleed Air from IOU~~
- ~~Recheck Water Flow Rates~~

Install EPROMs in Primary IOU NIO

Use this procedure to install new EPROMs in the primary IOU NIO cabinet. The new EPROMs will be shipped either with the secondary IOU or with the system console.

Prerequisite

- Primary IOU is powered off.

Tools and parts required:

- Antistatic wrist strap
- Antistatic work pad
- Antistatic bags
- EPROMs p/n 22132538 and 22132539

Procedure

CAUTION

Wear an antistatic wrist strap during the entire procedure to prevent damage to EPROMs.

NOTE

Since removing power from the IOU erases all deadstart programs, they must be reloaded after EPROM replacement and after restoration of power to IOU.

- 1. Attach antistatic wrist strap to wrist and to primary IOU frame ground.
- 2. Remove 1CQ0 board from location B22 in primary IOU. Place board in antistatic bag and set aside.
- 3. Remove 1JKH board from location B23 in primary IOU. Place board in antistatic bag, remove antistatic wrist strap, and carry bag to antistatic workpad.
- 4. Attach antistatic wrist strap to antistatic work pad.
- 5. Remove 1JKH board from antistatic bag and place on antistatic work pad.
- 6. Remove EPROMs from locations 20B1 and 37B1. Set EPROMs aside on work pad.
- 7. Install new EPROM p/n 22132539 in location 20B1.
- 8. Install new EPROM p/n 22132538 in location 37B1.
- 9. Insert 1JKH board in antistatic bag, remove antistatic wrist strap, and carry bag to primary IOU cabinet.
- 10. Attach antistatic wrist strap to primary IOU frame ground.

- ___ 11. Remove 1JKH board from antistatic bag and install in location B23 in primary IOU.
- ___ 12. Remove 1CQ0 board from antistatic bag and install in location B22 in primary IOU.

NOTE

IS SPARE 1JKH BOARD PRESENT?

- *If yes, perform steps 4 through 9 on spare 1JKH board.*
 - *If no, go to next procedure.*
-

Apply System Power

Applying system power consists of starting the M-G set and water cooling unit(s) from the SPM or SPCP, turning on power to the CP, CM, and IOU cabinets, and adjusting cabinet voltages as described in the following procedures:

WARNING

In case of a personnel or equipment emergency, press the SYSTEM EMERGENCY switch on the front of the interbay cabinet to remove system power.

- Apply M-G set power from SPM or SPCP.
- Apply power and adjust voltages for IOU NIO cabinet.
- Apply power and adjust voltages for IOU CIO cabinet.
- Checking water flow rates.

NOTE

Set all LOCAL/REMOTE switches on the various power distribution boxes, etc. to the REMOTE positions before applying system power.

Apply M-G Set Power From SPCP (845/855 Systems Only)

Use the following procedure to apply 400-Hz power to the M-G set from the SPCP. Refer to figure 2-78.

Procedure prerequisites

- M-G set power was previously checked out and run in the local mode of operation. M-G set is set for remote operation.
- M-G set output voltages were previously adjusted.
- All wall-mounted disconnect boxes that control power from the M-G set to the computer system are set to OFF.

Procedure

1. Set 400-Hz wall-mounted circuit breaker for SPCP to ON.
2. Press and release REMOTE ENABLE/LOCAL START switch on front of SPCP. M-G set starts; POWER ON indicator on front of SPCP lights.
3. Allow M-G set to operate until percentage meter on SPCP stabilizes at 0 percent.

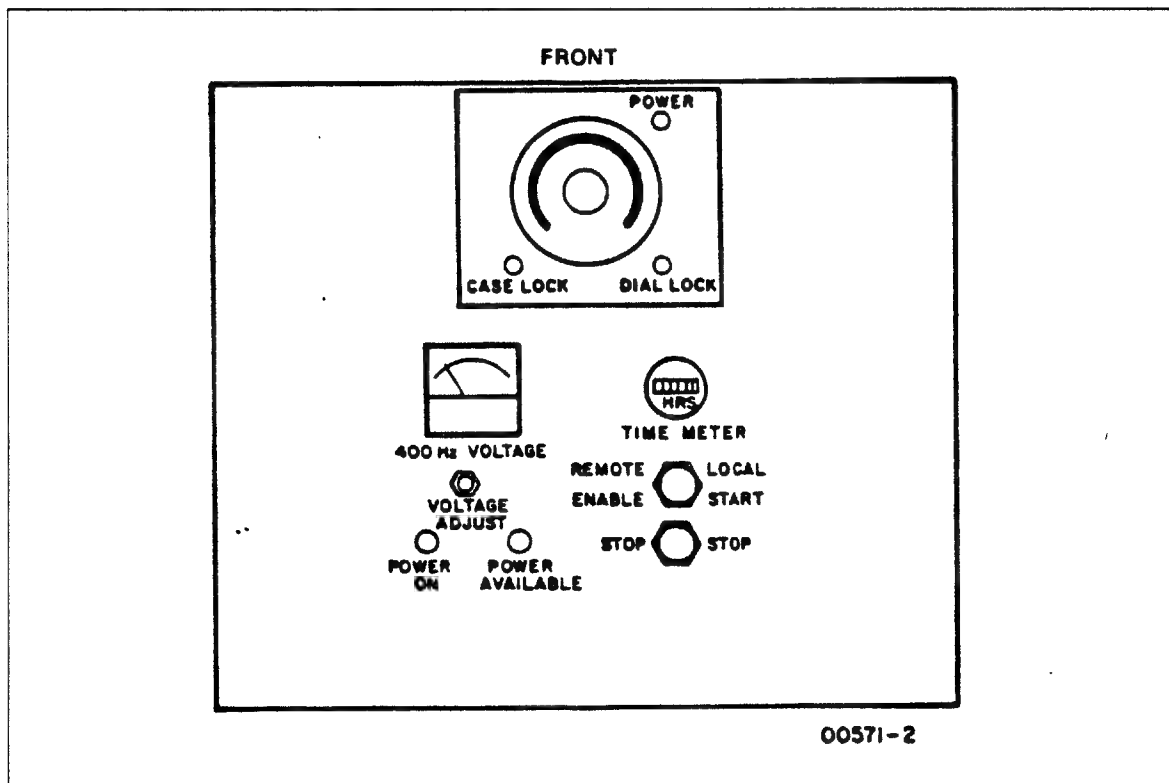


Figure 2-78. Applying M-G Set Power From SPCP

Apply M-G Set Power From SPM

Use this procedure to start the M-G set power from the controls on the system power monitor (SPM). Refer to figures 2-79 and 2-80.

NOTE

DOES SYSTEM USE AN SPM?

- If yes, continue.
 - If no, go to next procedure.
-

Procedure prerequisites

- M-G set power was previously checked out and run in the local mode of operation. M-G set is set for remote operation.
- M-G set output voltages were previously adjusted.
- All wall-mounted disconnect boxes that control power from the M-G set to the computer system are set to OFF.
- Switch groups SN1, SN2, and SN3 in the SPM were set to system conditions during preinstallation procedures.

Tools/parts required

- Slotted screwdriver

Procedure

- 1. Remove two retaining screws and open SPM door.
- 2. Verify that switches SN3-8 and SN3-9 are set to OFF. If no equipment connects to J5 and J6 on bottom of SPM, set these switches to ON.
- 3. Set switches SN2-1 through SN2-4 as needed, if any changes were made to the M-G set configuration. The settings are:

SN2-1	Selects M-G set 1.	Switch setting is determined by site
SN2-2	Selects M-G set 2.	configuration. Selection of M-G set 1 or 2 is
SN2-3	Selects M-G set 3.	required. ON position enables selection; OFF
SN2-4	Selects M-G set 4.	disables selection. Unused M-G switches may
		be left in the ON position.
- 4. Close SPM door and install retaining screws.
- 5. Set wall-mounted circuit breaker that controls 50/60-Hz power to SPM to ON. This circuit breaker may not be present at all sites.

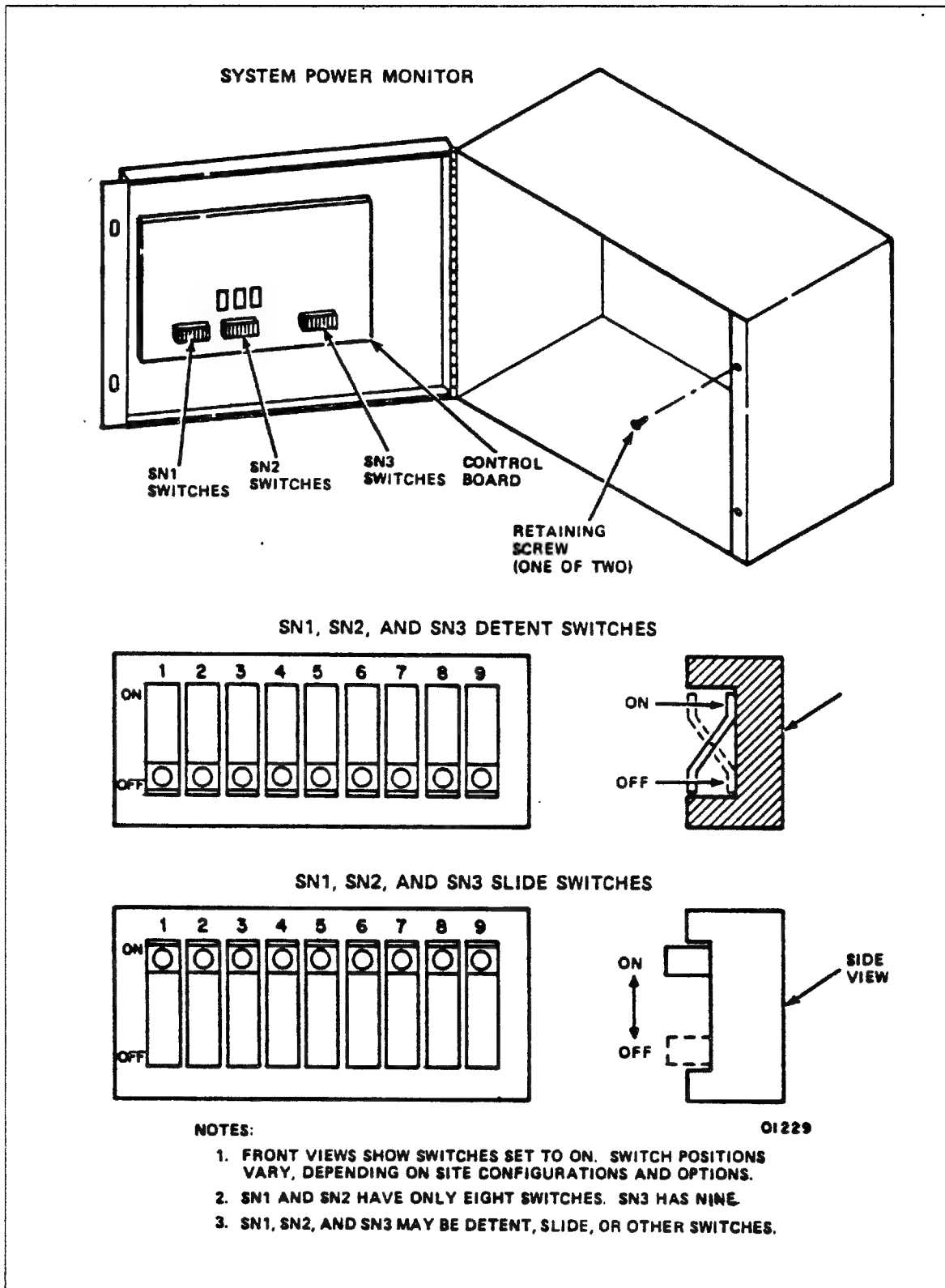


Figure 2-79. Checking SPM Switches SN1, SN2, and SN3

- ___ 6. Set keyswitch on side of SPM to LOCAL.
- ___ 7. Set SYSTEM EMERGENCY switch on interbay to ON.
- ___ 8. Set SYSTEM DISCONNECT switch on left side of SPM to ON. This applies 50/60-Hz power to SPM.
- ___ 9. Press and release LOCAL START switch on front of SPM.

NOTE

Switch SN2-8 in SPM must be set to OFF or COLUMN FAULT indicator lights.

NOTE

Allow 1 min for MG to obtain full output voltage.

- ___ 10. Verify that SYSTEM ON and ROOM ON indicators on SPM are on and SPM cooling fan is running.
- ___ 11. Set selector switch to select system MG being used: selection 1, 2, 3, or 4.
- ___ 12. Set function switch on front of SPM to MG PHASE 1. Verify that MG phase 1 voltage display is between 118 V and 120 V.
- ___ 13. Set function switch to MG PHASE 2. Verify that MG PHASE 2 voltage display is between 118 V and 120 V.
- ___ 14. Set function switch to MG PHASE 3. Verify that MG PHASE 3 voltage display is between 118 V and 120 V.
- ___ 15. Adjust VOLTAGE ADJUST setscrew on front of SPM, if necessary, to obtain correct MG phase voltages.
- ___ 16. Repeat steps 10 through 14 for other M-G sets in system, if applicable.
- ___ 17. Set mode switch on each WCU (as applicable) as follows:
 - Set LOCAL/REMOTE switch on GH251-A, GH251-C, GH252-A or GH252-C (if used) to REMOTE.
 - Set MANUAL/AUTO switch on GH252-A or GH252-C (if used) to MANUAL.These positions allow the SPM or SPCP to remotely control starting and stopping of the WCUs.
- ___ 18. Press STOP switch on front of SPM, and verify powerdown of M-G set and water cooling unit.
- ___ 19. Wait 5 min for MG to power down. Press LOCAL START switch on front of SPM to restart M-G set and water cooling unit. Allow M-G power to remain on for following checks.

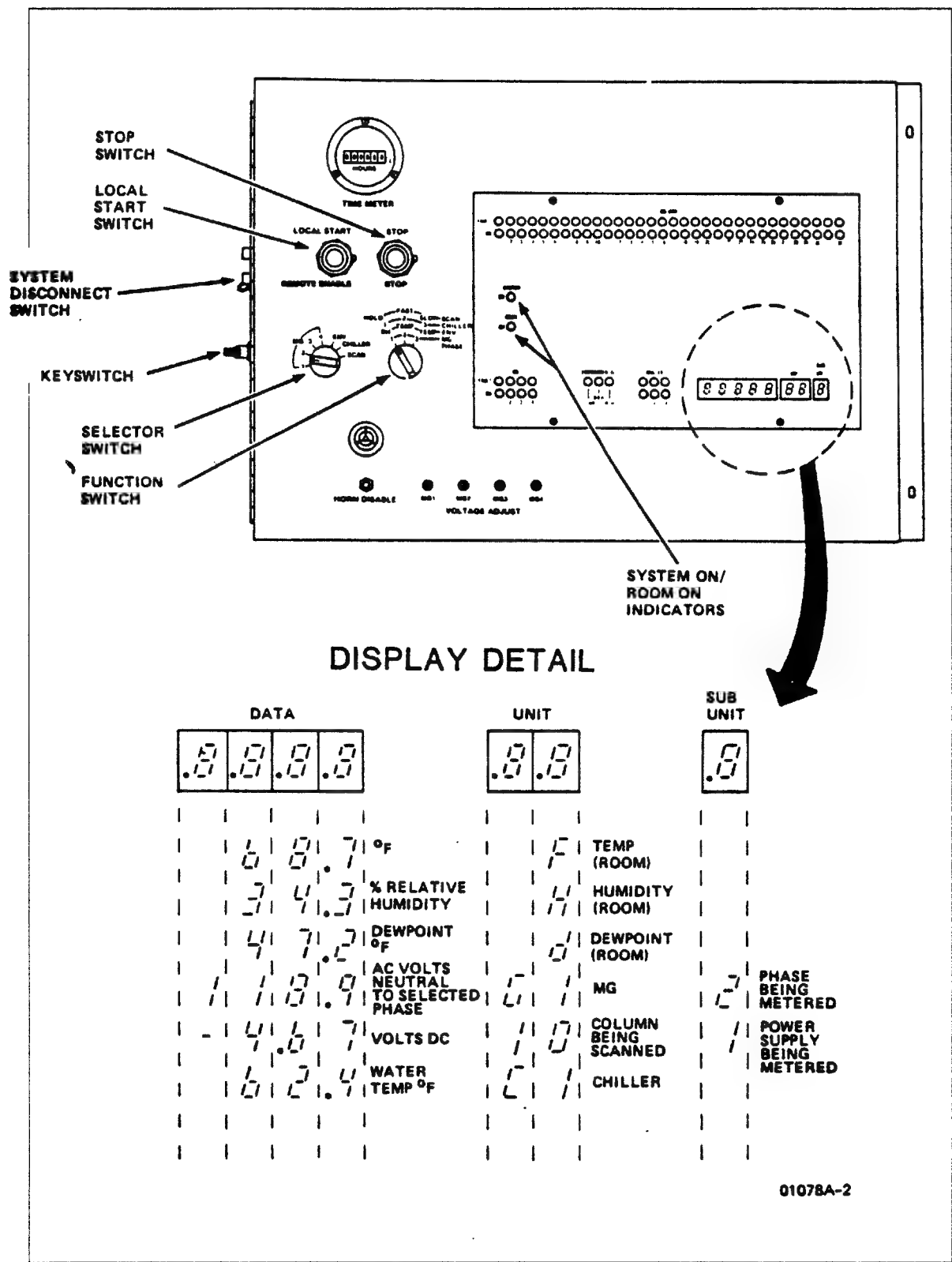


Figure 2-80. Applying M-G Set Power From SPM

Apply Power and Adjust Voltages for IOU NIO Cabinet

Use this procedure for the first application of power to the IOU nonconcurrent input/output (NIO) cabinet and for the adjustment of the IOU NIO logic voltages. Refer to figures 2-81 and 2-82.

NOTE

This procedure includes applying clock (master oscillator) power.

Procedure prerequisites:

- Water cooling unit for both IOU cabinets is operating
- Power has been applied to the IOU NIO cabinet

Tools/parts required

- Digital multimeter, John Fluke Model 8020A or equivalent

Procedure

- 1. Set following circuit breakers and voltage adjust knobs on IOU NIO cabinet power distribution box as follows:
 - a. Set mode switch on top right corner of both IOU NIO and CIO power distribution boxes to LOCAL.
 - b. MAIN DISCONNECT to OFF
 - c. -2.2 V DISCONNECT to OFF
 - d. -5.2 V DISCONNECT to OFF
 - e. -2.2 V ADJUST knob fully counterclockwise
 - f. -5.2 V ADJUST knob fully counterclockwise
- 2. Set CB3 switch on auxiliary power supply at rear of IOU NIO cabinet to off, (down).
- 3. Set wall-mounted circuit breakers that control 50/60- and 400-Hz power to interbay power panel to ON.
- 4. Set 50/60-Hz MAIN DISCONNECT and 400 Hz MAIN DISCONNECT circuit breakers on interbay power panel to ON.
- 5. Set IOU-1 50/60 Hz circuit breaker and IOU-1 400-Hz circuit breaker on interbay power panel to ON.

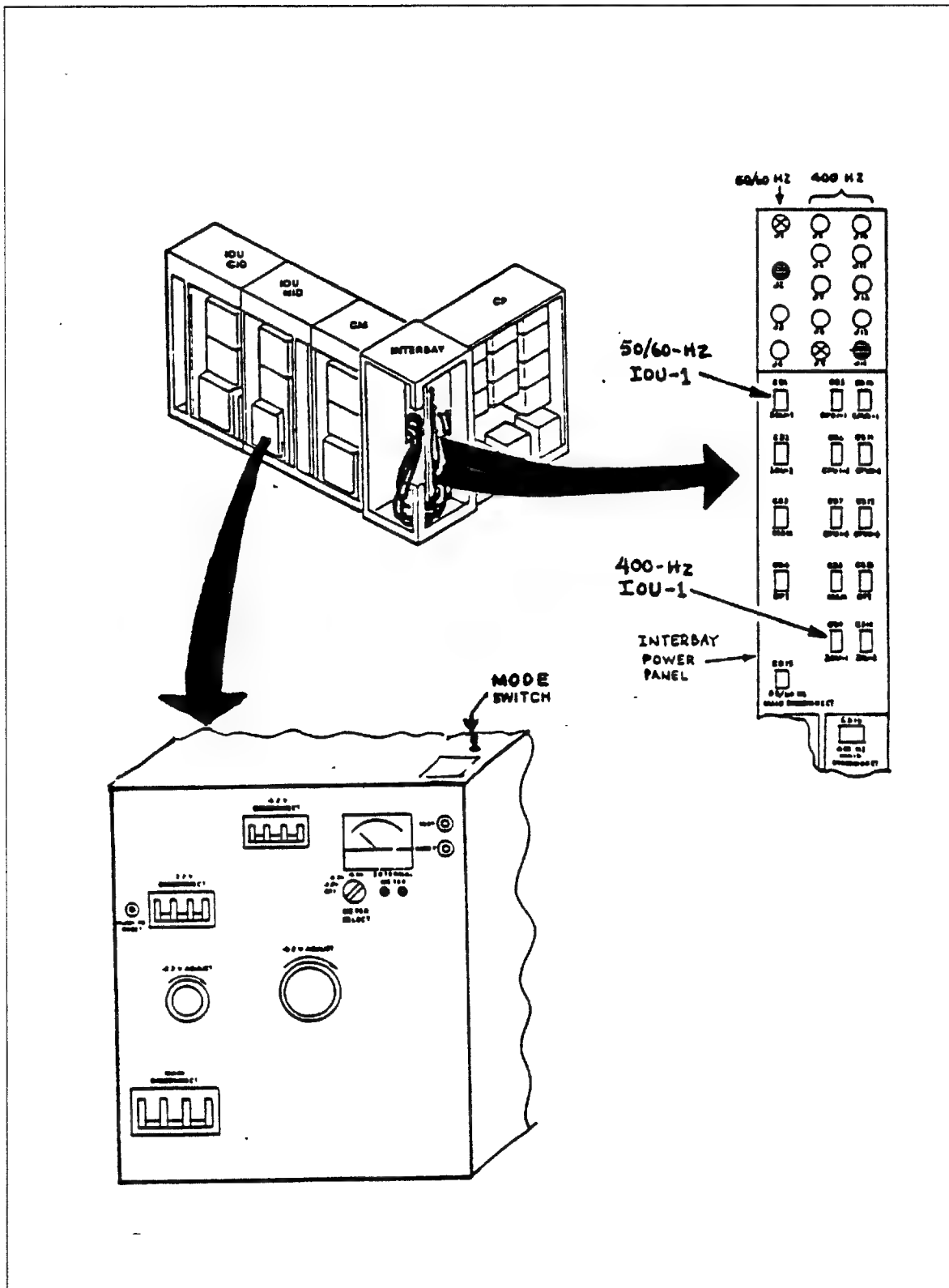


Figure 2-81. IOU NIO Power Controls and Adjustments

- ___ 6. Set CB3 on auxiliary power supply to on, up position.
- ___ 7. Apply IOU NIO cabinet power by sequentially setting section circuit breakers as follows:
 - ___ a. -2.2 V DISCONNECT to ON
 - ___ b. -5.2 V DISCONNECT to ON
 - ___ c. MAIN DISCONNECT to ON
 - ___ d. Press and release RESET switch at front and upper-right corner of power distribution box.
- ___ 8. Listen for noise of circulating air to ensure that section blower is operating.

CAUTION

Use voltages indicated by V1 V2 V3 label located on power distribution box when adjusting or inspecting -2.2V, -4.7V, and +5.0V terminator and logic voltages on the CP, CM, and IOU columns. If column power distribution box does not display V1 V2 V3 label, use voltages indicated in this manual.

- ___ 9. Adjust -5.2 V as follows:
 - ___ a. Set METER SELECT switch to -5.2 V.
 - ___ b. Turn -5.2 V ADJUST knob slowly on front of power distribution box until multimeter indicates a nominal -5.20 V.
- ___ 10. Check low-temperature sensor voltage and, if necessary, adjust it as follows:
 - ___ a. Set multimeter to measure +9 to 10 V dc using next meter scale greater than 10 V dc.

CAUTION

Place multimeter leads lightly on TB1 terminals to prevent bending of the low-temperature assembly. Bending this assembly may cause an erroneous voltage reading.

- ___ b. Place meter negative (-) lead through hole in cover on low-temperature sensor terminal TB1-1 and positive lead (+) through hole in cover on terminal TB1-3.
- ___ c. Observe multimeter reading. If voltage is not within 9.9 to 10.1 Vdc, adjust potentiometer on low-temperature assembly.
- ___ d. Remove multimeter leads from TB1.
- ___ 11. Set mode switch on top right corner of power distribution box to REMOTE.
- ___ 12. Swing power distribution box into IOU NIO cabinet and install retaining screw.

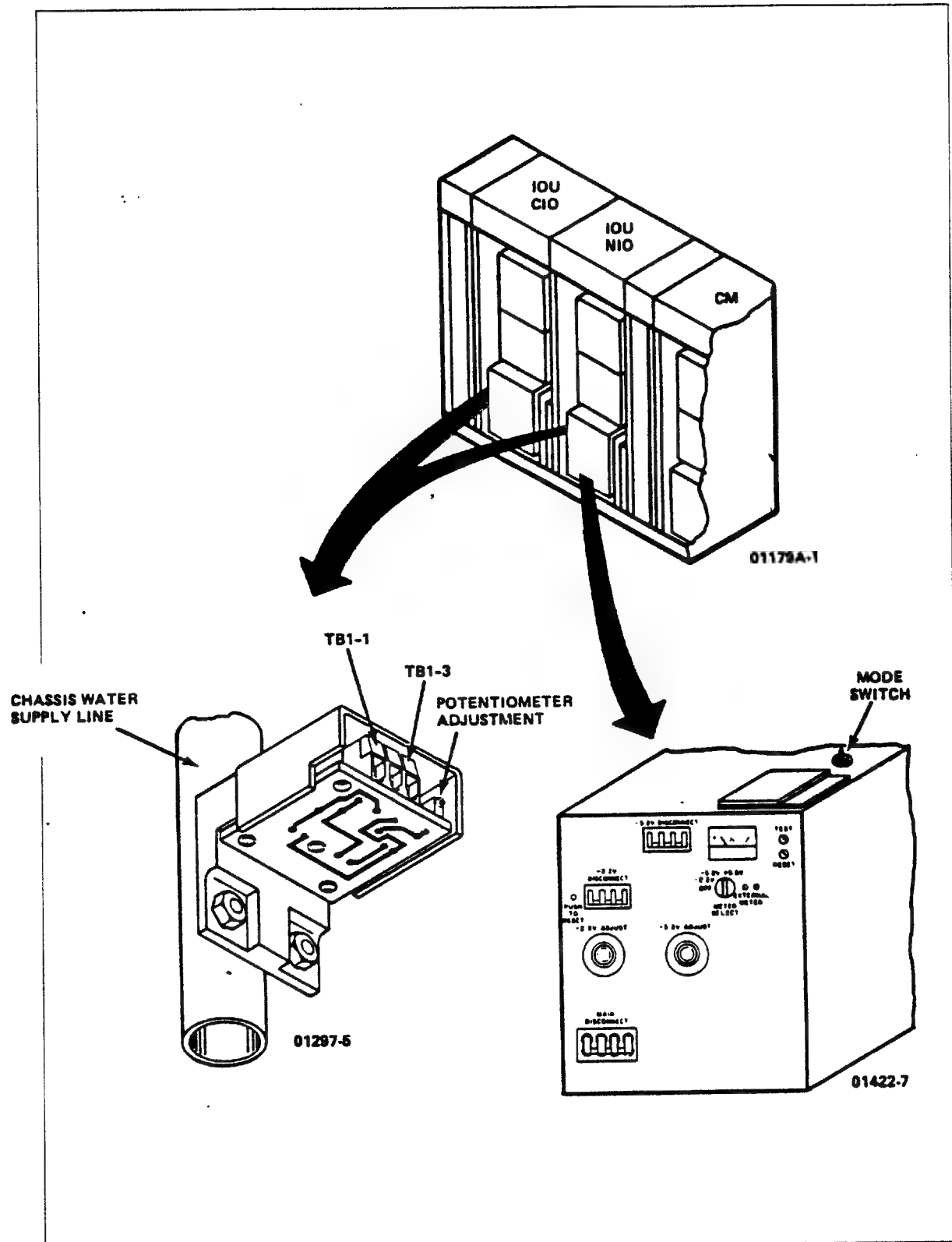


Figure 2-82. IOU NIO Power Distribution Box and Low Temperature Sensor Assembly

Apply Power and Adjust Voltages for IOU CIO Cabinet

Use this procedure for the first application of power to the IOU concurrent input/output (CIO) and for the adjustment of IOU CIO logic voltages. Refer to figures 2-83 and 2-84.

Procedure prerequisites

- Water cooling unit for both IOU cabinets is operating
- Power has been applied to IOU NIO cabinet and voltages adjusted on the IOU NIO cabinet

Tools/parts required

- Digital multimeter, John Fluke Model 8020A or equivalent

Procedure

- 1. Set following circuit breakers and voltage adjust knobs on IOU CIO cabinet power distribution box as follows:
 - MAIN DISCONNECT to OFF.
 - -2.2 V DISCONNECT to OFF.
 - -5.2 V DISCONNECT to OFF.
 - +5.5 V DISCONNECT to OFF.
 - -2.2 V ADJUST knob fully counterclockwise.
 - -5.2 V ADJUST knob fully counterclockwise.
 - +5.5 V ADJUST knob fully counterclockwise.
- 2. Set IOU-2 50/60-Hz circuit breaker and IOU-2 400-Hz circuit breaker on interbay power panel to ON.
- 3. Apply CIO cabinet power by sequentially setting section circuit breakers as follows:
 - a. Set mode switch on top right corner of power distribution box to LOCAL.
 - b. -2.2 V DISCONNECT to ON
 - c. -5.2 V DISCONNECT to ON
 - d. +5.5 V DISCONNECT to ON
 - e. MAIN DISCONNECT to ON
 - f. Press and release RESET switch at upper-right corner of power distribution box.
- 4. Listen for noise of circulating air to ensure that CIO section blower is operating.

- 5. Connect multimeter to EXTERNAL METER test points on front panel of CIO power distribution box.

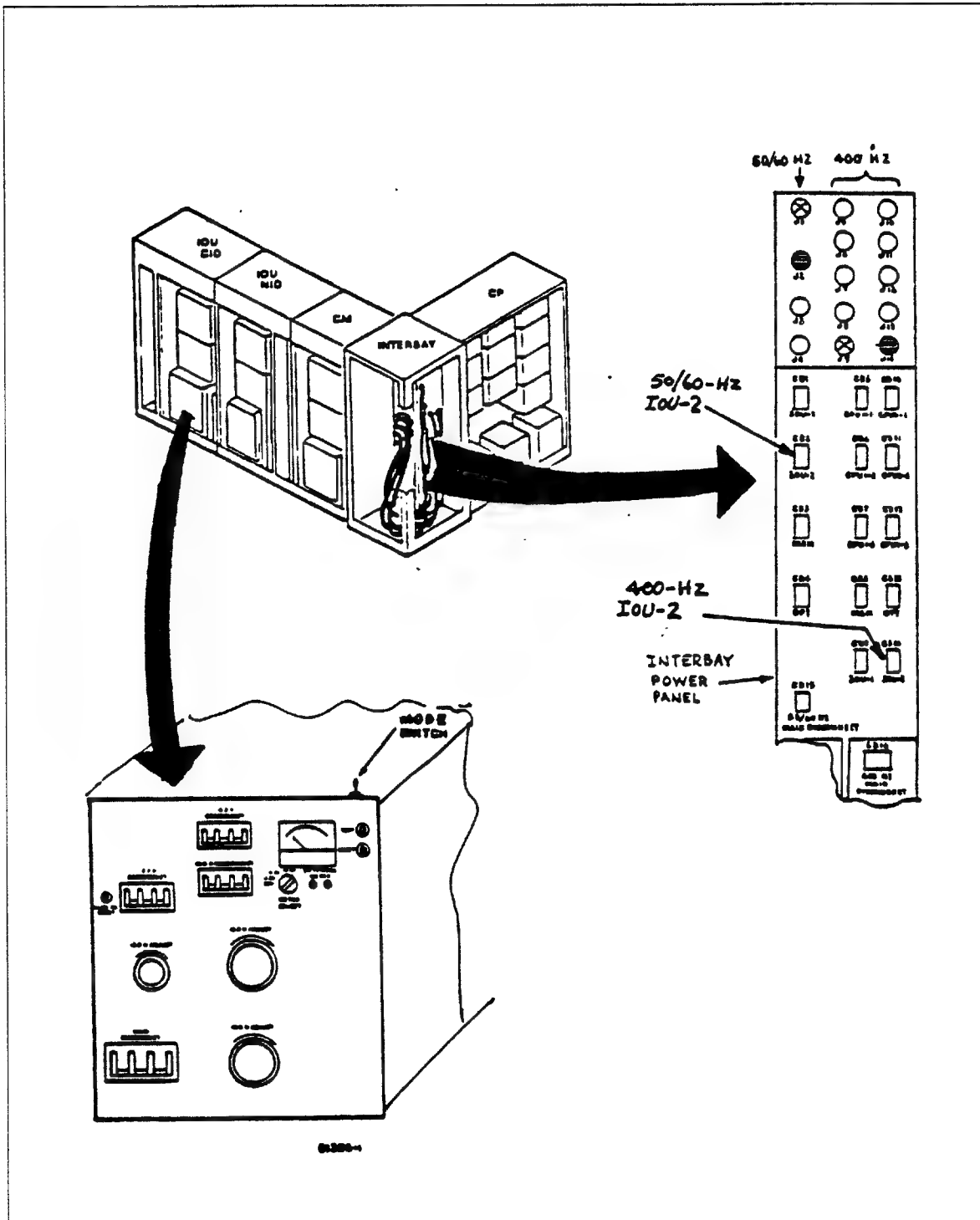


Figure 2-83. IOU CIO Power Controls and Adjustments

CAUTION

Use voltages indicated by V1 V2 V3 label located on power distribution box when adjusting or inspecting -2.2V, -4.7V, and +5.0V terminator and logic voltages on the CP, CM, and IOU columns. If column power distribution box does not display V1 V2 V3 label, use voltages indicated in this manual.

- ___ 6. Adjust -5.2 V as follows:
 - ___ a. Set METER SELECT switch to -5.2 V.
 - ___ b. Turn -5.2 V ADJUST knob slowly on front of power distribution box until multimeter indicates a nominal -5.20 V.
- ___ 7. Adjust -2.2 V as follows:
 - ___ a. Set meter SELECT SWITCH to -2.2 V.
 - ___ b. Turn -2.2 V ADJUST knob slowly on front of power distribution box until multimeter indicates a nominal -2.20 V.

NOTE

Adjust the +5.5 V after adjusting the -2.2 V and -5.2 V.

- ___ 8. Adjust CIO power supply +5.5 V as follows:
 - ___ a. Set meter SELECT SWITCH to +5.5 V.
 - ___ b. Turn +5.5 V ADJUST knob slowly on front of power distribution box until multimeter indicates a nominal +5.00 V.
 - ___ c. Adjust R6 at rear of percentage meter to obtain a percentage meter indication of 0. If R4 or R5 did not require adjustment, gain access to R6 by swinging power distribution box outward from cabinet and removing top plate.
 - ___ d. Disconnect multimeter from EXTERNAL METER test points.
 - ___ e. Install top plate, if removed earlier, on power distribution box.
- ___ 9. Check low-temperature sensor voltage and, if necessary, adjust it as follows:
 - ___ a. Set multimeter to measure 9 to 10 Vdc using next meter scale greater than 10 Vdc.

CAUTION

Place multimeter leads lightly on TB1 terminals to prevent bending of the low-temperature assembly. Bending this assembly may cause an erroneous voltage reading.

- ___ b. Place meter negative (-) lead through hole in cover on low-temperature sensor terminal TB1-1 and positive lead (+) through hole in cover on terminal TB1-3.

- ___ c. Observe multimeter reading. If voltage is not within 9.9 to 10.1 Vdc, adjust potentiometer on low-temperature assembly.
- ___ d. Remove multimeter leads from TB1.
- ___ 10. Set mode switch on top right corner of power distribution box to REMOTE.
- ___ 11. Swing power distribution box into IOU CIO cabinet and install retaining screw.

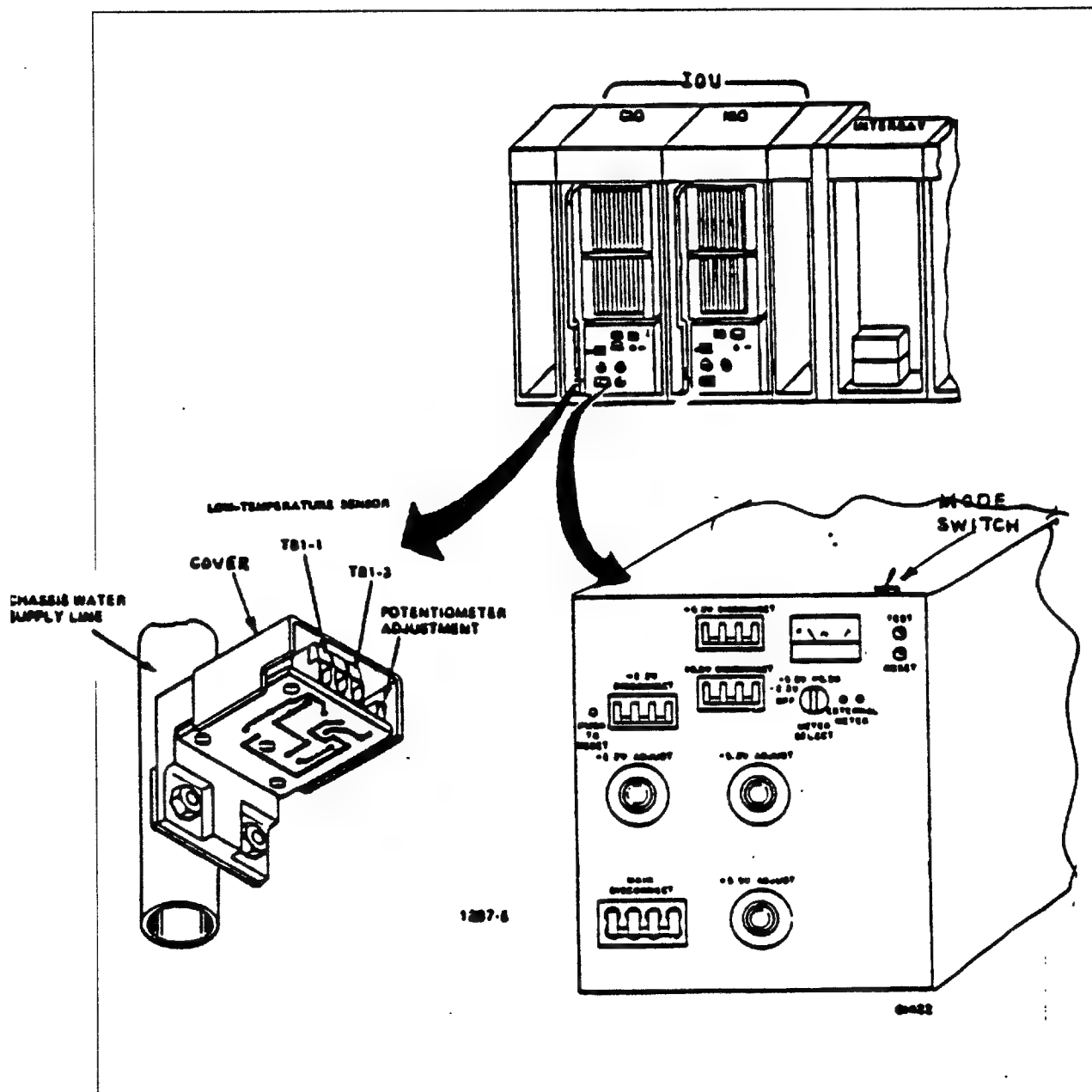


Figure 2-84. IOU CIO Power Distribution Box and Low Temperature Sensor Assembly

Bleed Air From IOU

Use this procedure to bleed air from the IOU. Refer to figure 2-85.

Procedure prerequisites

- Water cooling unit is operating

Tools/parts required

- Paper tissues or towel for absorbing water
- Quick coupler opener, P/N 18789100
- Vinyl hose, 1/2-in diameter

Procedure

1. Hold paper tissues or towel under bleed valve in NIO section of IOU.

NOTE

Some units have more than one bleed valve location. See figure. Also, some units may have Schrader bleed valves instead of petcock valves. For those that have Schrader valves, use quick coupler opener and vinyl hose to bleed unit.

2. Open valve slowly and allow air to escape. When water begins to escape, shut valve.

3. Remove paper tissues or towel.

4. Add water, as necessary, to maintain water level at three-fourths full in sight glass.

- If water pump motor stops operating while bleeding air, and LOW WATER LEVEL indicator on power disconnect box lights:

- a. Set INPUT POWER DISCONNECT switch on water cooling unit to OFF

- b. Add water and restart pump motor.

- If water pump motor stops operating and HIGH WATER LEVEL indicator on power disconnect box lights:

- a. Set INPUT POWER DISCONNECT switch on water cooling unit to OFF.

- b. Attach drain hose to water tank drain valve and place hose in empty water container.

- c. Open water tank drain valve and drain water into container until sight glass indicates three-fourths full.

- d. Close drain valve.

- e. Remove drain hose and container.

- f. Restart pump motor.

- 5. Repeat this procedure for optional IOU CIO and CM cabinets.

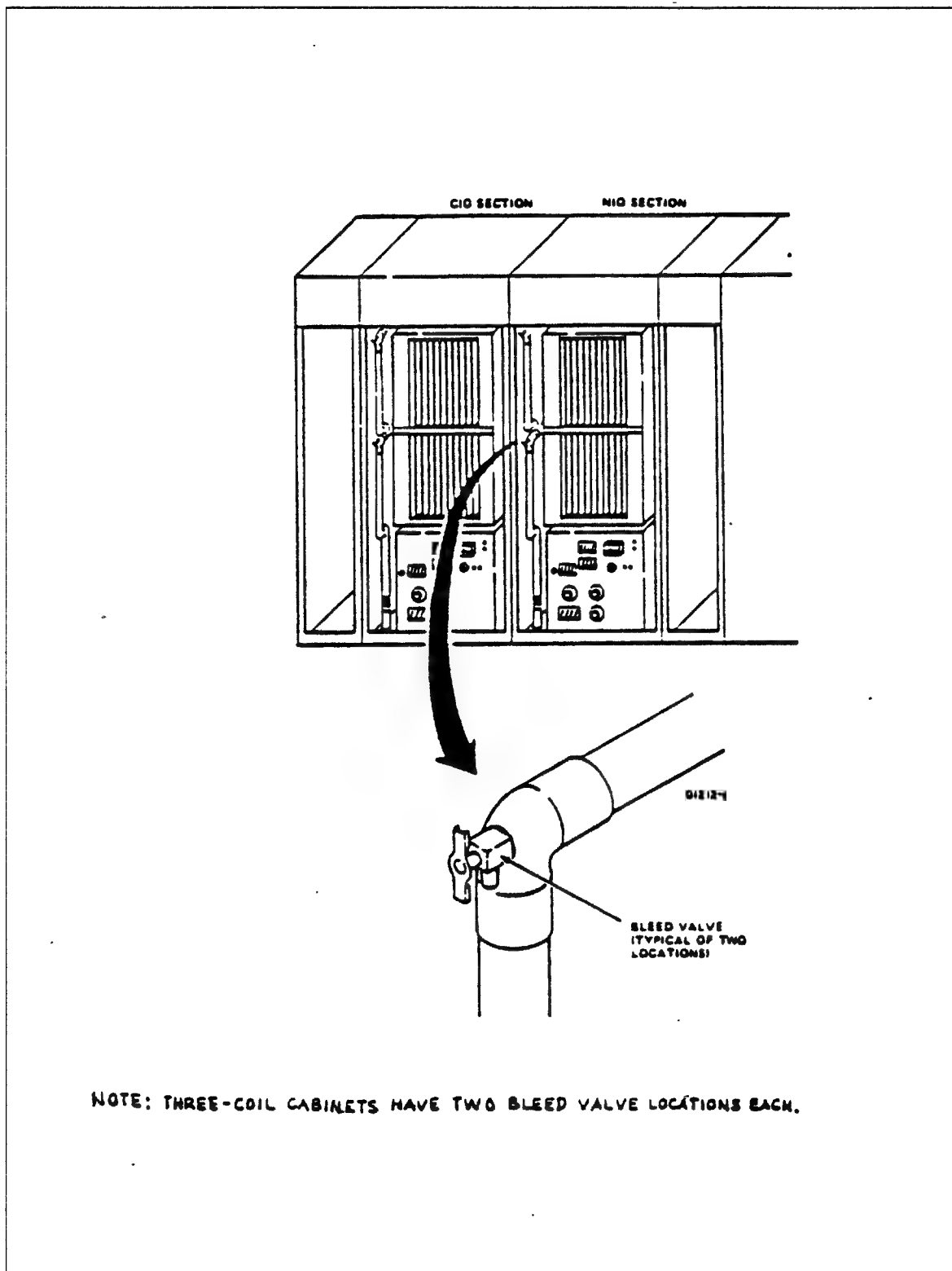


Figure 2-85. IOU

Air Bleed Valve Locations

Recheck Water Flow Rates

Use this procedure to recheck the initial settings of the water flow rates through the CM, CP, and IOU columns. This recheck is necessary after stabilization of the water flow through the system. Refer to figure 2-86.

Procedure prerequisites

- All previous procedures in this chapter have been completed and the WCU is operating.

Procedure

- 1. Check to ensure that water flow meters on under-floor water manifolds have following flow rates:
 - a. IOU NIO cabinet, 15.1 L (4 gal) per min.
 - b. IOU CIO cabinet 15.1 L (4 gal) per min.
 - c. CM cabinet, 7.6 L (2 gal) per min.
 - d. CP-0 and CP-1 (if present) column 1 cabinets, 11.4 L (3 gal) per min.
 - e. CP-0 and CP-1 (if present) column 2 cabinets, 11.4 L (3 gal) per min.
 - f. CP-0 and CP-1 (if present) columns 3 cabinets, 15.1 L (4 gal) per min.
 - g. Adjust control valves as necessary to correct water flow rates.
- 2. Install all covers on flow meters.
- 3. Check water cooling unit for following gauge readings:
 - a. PUMP OUTLET PRESSURE gauge
 - For 60-Hz power, 483 to 635 kPa (70 psi to 92 psi).
 - For 50-Hz power, 276 to 414 kPa (40 psi to 60 psi).
 - b. CHASSIS WATER TEMPERATURE gauge has a reading of 16.7°C to 18.3°C (62°F to 65°F).
 - c. CHILLED WATER TEMPERATURE gauge has a reading of 4.4°C to 10.0°C (40°F to 50°F).
- 4. Make any necessary adjustments to obtain correct pressure and temperature. These adjustments are described in an earlier procedure in this chapter, Check Water Cooling Unit Temperature, Pressure, and Flow.

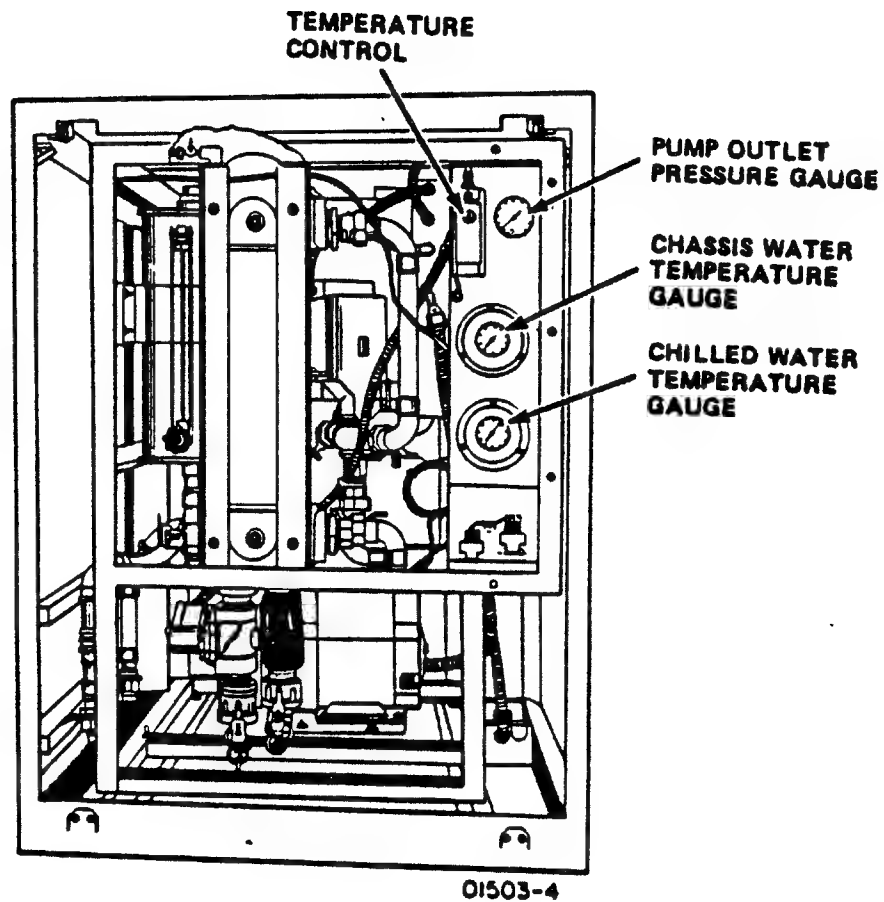


Figure 2-86. GH251-C WCU Temperature and Pressure Gauges

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AD113-A Central Processor Installation 3

This section contains procedures for installing the optional second Central Processor (CP-1) in either of the CYBER 180 Model 855 or 860 Computer Systems only.

Tasks identified in this section are:

- Remove Power From Computer System
 - Remove Power From CP-0
 - Remove Power From AB115-A IOU
 - Remove Power From AT478-A/AT481-A IOU
 - Remove Power From BS213-A CM
 - Remove Power From Water Cooling Unit
 - Remove Site Power From Computer System
- Preinstallation Procedures For CP-1 Cabinet
- Install Optional AD113-A Central Processor (CP-1) Cabinet
 - Turn Off Water Supply to System
 - Place and Bolt CP-1 Cabinet
 - Connect CP-1 Water Hoses to Manifolds
 - Connect CP-1 Clock Cables to CM
 - Connect CP-1 Fault-Sense Cable to CM Multiplexer Board
 - Connect CP-1 Local Memory Cables to CP-0 Interface Boards
 - Connect CP-1 Power Cords to Interbay Power Panel
- Prepare Water Cooling Unit
- Apply System Power
 - Apply M-G Set Power From SPM
 - Apply M-G Set Power From SPCP (845/855 Systems Only)
 - Apply Power and Adjust Voltages For CP-1
- Check Water Flow Rates

Tools and parts required for the tasks include the following:

- Diagonal cutter or knife
- Two Rol-a-lifts
- Two cam-action rollers
- Two heavy-gauge steel plates
- Bolting hardware: 1/4-20 bolts, 1/2-in and 1-in long; 1/4-20 nuts
- Two 3/8-in-drive socket wrench sets
- Drift pin
- Two local terminal signal cables
- Clock terminator plugs, PN 53695211, as required
- Emergency off jumper plug, PN 53582695
- Slotted screwdriver
- Phillips screwdriver
- Digital multimeter
- Calibrated temperature probe for digital multimeter
- Paper tissues or a cloth towel
- Adjustable wrench
- 1/4-in refrigeration wrench
- 5/16-in refrigeration wrench

- CYBER Initialization Package (CIP) User's Handbook
- Antistatic wrist strap
- Antistatic smock

Remove Power From Computer System

Prior to installing an optional CP-1 cabinet, power must be removed from the existing computer system. This procedure consists of the following tasks:

- Remove Power From CP-0
- Remove Power From AB115-A IOU
- Remove Power From AT478-A/AT481-A IOU
- Remove Power From BS213-A CM
- Remove Power From Water Cooling Unit
- Remove Site Power From Computer System

Remove Power From CP-0

Use this procedure to remove the power from the CP-0 cabinet. Refer to figures 3-1 and 3-2.

Procedure

- 1. Set mode switches on rear of each of four CP-0 50/60-Hz power distribution boxes to LOCAL.
- 2. Press and release STOP switch at rear of CP-0 main cabinet 50/60-Hz Power Distribution Box to remove 400-Hz power.
- 3. Set INPUT POWER DISCONNECT circuit breaker on CP-0 end cabinet power distribution box to OFF to remove 50/60-Hz power.
- 4. Set MAIN 400 Hz DISCONNECT circuit breaker on front of CP-0 main cabinet 400 Hz power distribution boxes to OFF.

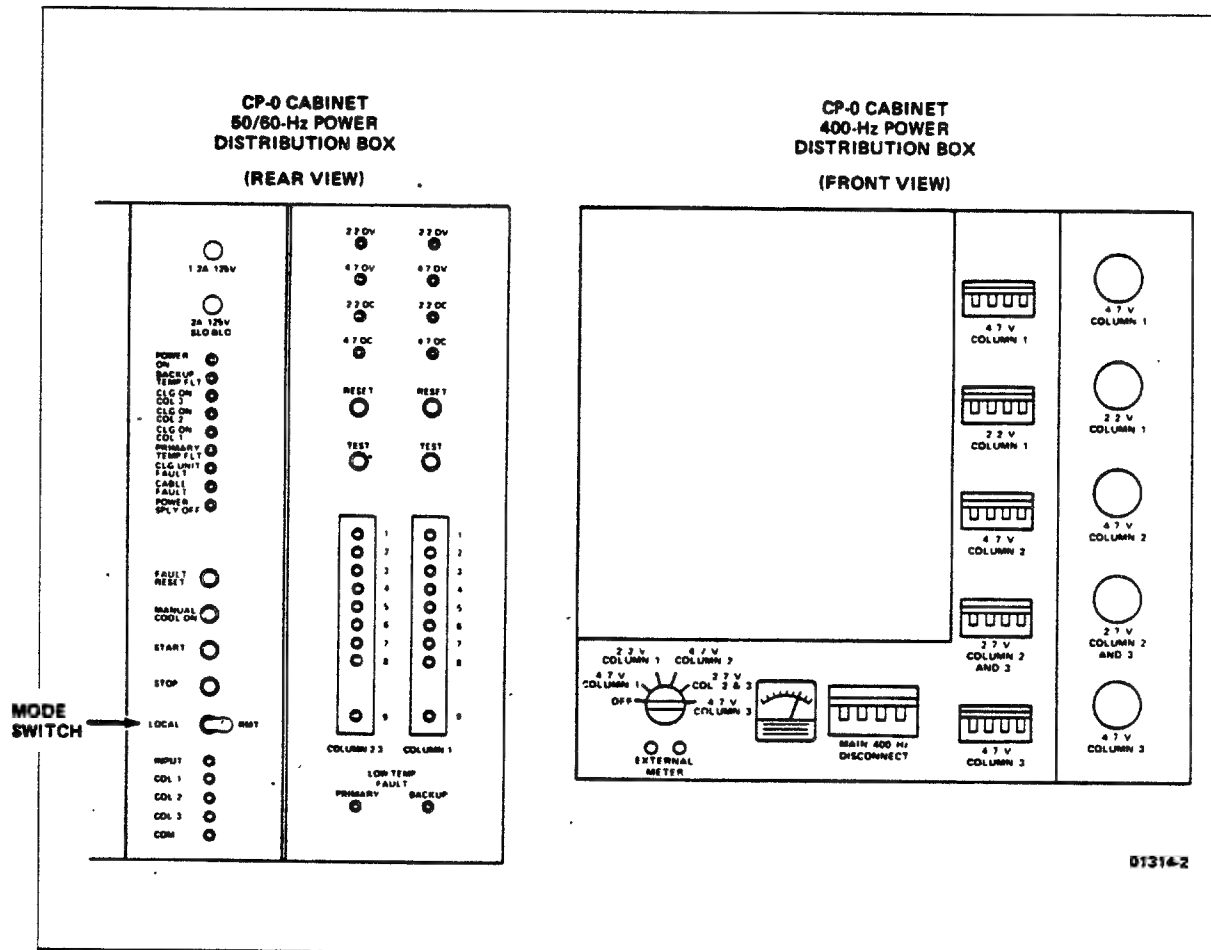


Figure 3-1. CP-0 Main Cabinet 50/60- and 400-Hz Power Distribution Boxes

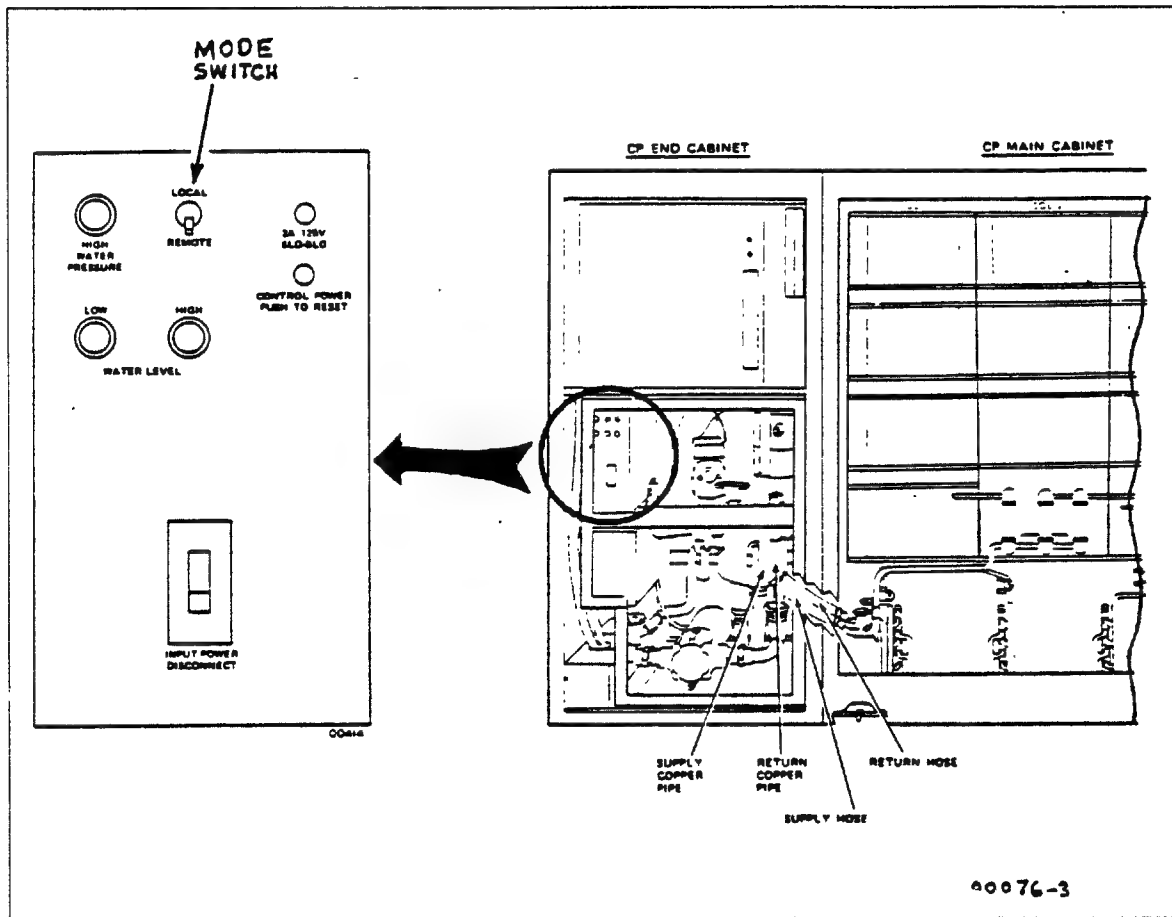


Figure 3-2. CP-0 End Cabinet 50/60-Hz Power Distribution Box

To present the information in this chapter in a structured format, this page has been left blank.

Remove Power From AB115-A IOU

Use this procedure to remove the power from the IOU cabinet. Refer to figure 3-3.

NOTE

IS IOU AN AB115-A?

- If yes, continue.
- If no, go to next procedure.

Procedure

1. Set CONTROL (mode) switch on 50/60-Hz power distribution box to LOCAL.
2. Press and release POWER OFF switch at rear of 50/60-Hz power distribution box to remove 400-Hz power.
3. Set MAIN POWER DISCONNECT circuit breaker at rear of 50/60-Hz power distribution box to OFF to remove 50/60-Hz power.
4. Set 400-Hz DISCONNECT circuit breaker on front of 400-Hz power distribution box to OFF.

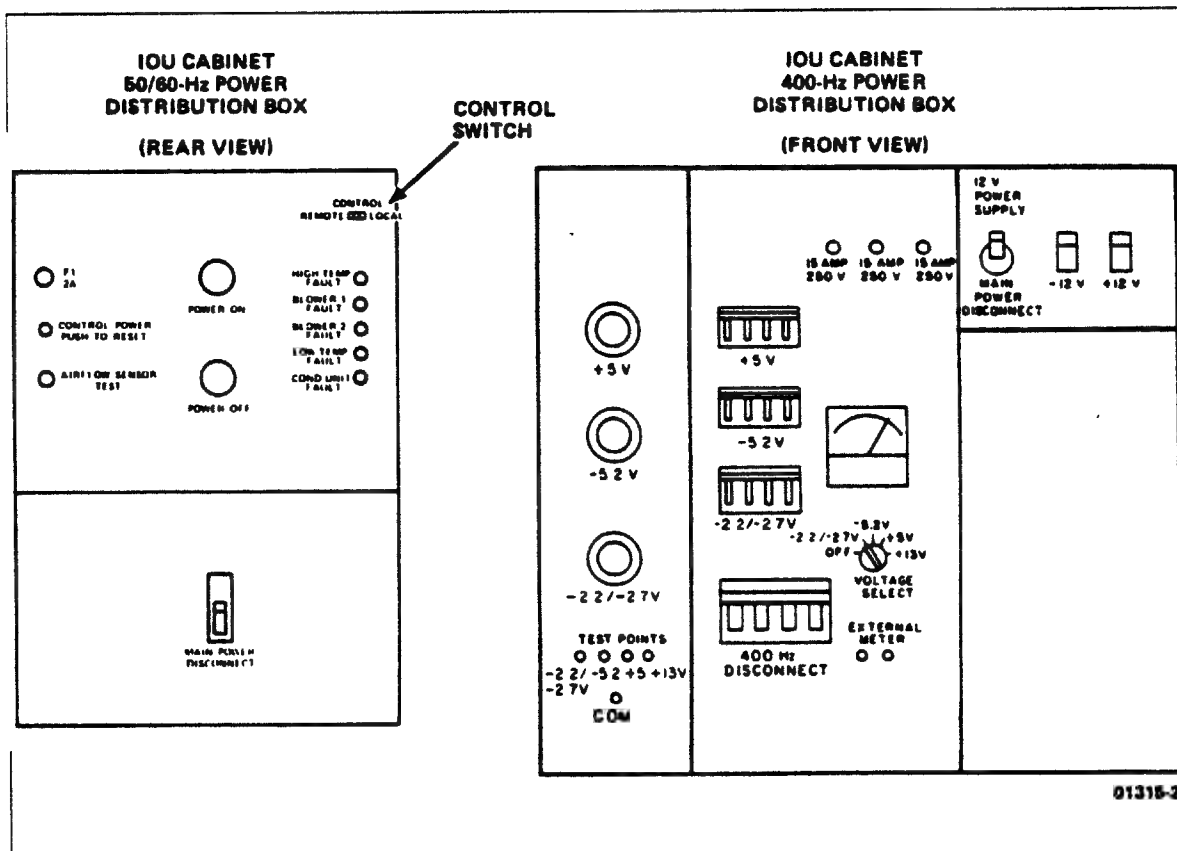


Figure 3-3. AB115-A IOU 50/60-Hz and 400-Hz Power Distribution Boxes

Remove Power From AT478-A/AT481-A IOU

Use this procedure to remove power from the IOU (NIO/CIO) cabinet. Refer to figure 3-4.

NOTE

IS IOU AN AT478-A/AT481-A?

- *If yes, continue.*
 - *If no, go to next procedure.*
-

Procedure

- 1. Set mode switches on both NIO and CIO cabinet power distribution boxes to LOCAL.
- 2. Set MAIN DISCONNECT circuit breakers on both NIO and CIO cabinet power distribution boxes to off (down).
- 3. Set 50/60-Hz MAIN DISCONNECT and 400-Hz MAIN DISCONNECT circuit breakers on interbay power panel to off (down).

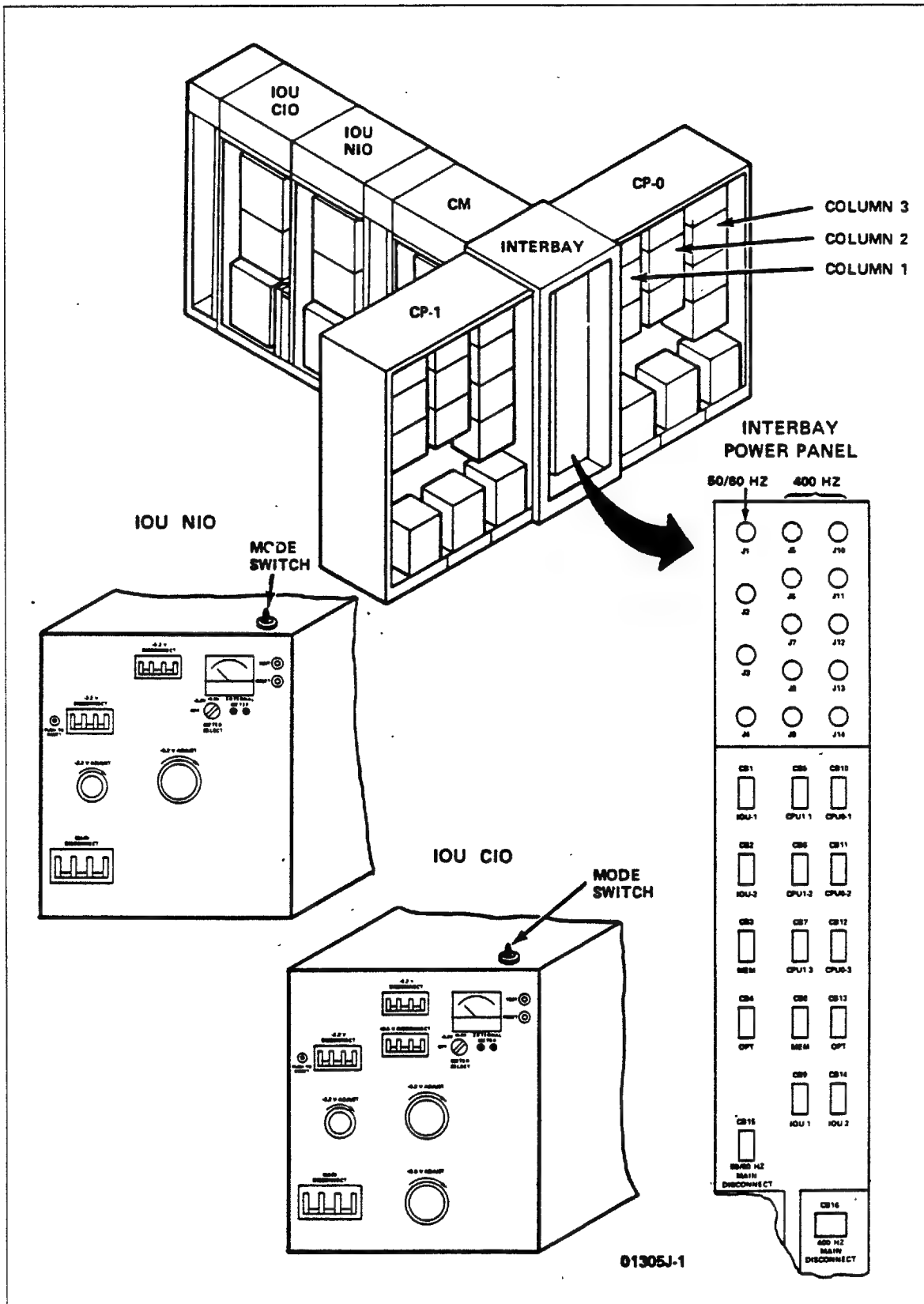


Figure 3-4. AT478-A/AT481-A IOU Power Distribution Boxes and Interbay Power Panel

Remove Power From BS 213-A CM

NOTE

IS CM A BS213-A?

- If yes, continue.
- If no, stop installation of CP-1. Adding an optional CP-1 is not permitted in 855 systems having a BS137-A CM; system must have a BS213-A. Refer to 845/855 Upgrade Options I & C/O manual listed under Related Manuals for installation of BS213-A CM.

Use this procedure to remove the power from the CM cabinet. Refer to figure 3-5.

Procedure

1. Set mode switch on 400-Hz power distribution box to LOCAL.
2. Set MAIN DISCONNECT circuit breaker on front of power distribution box to OFF.

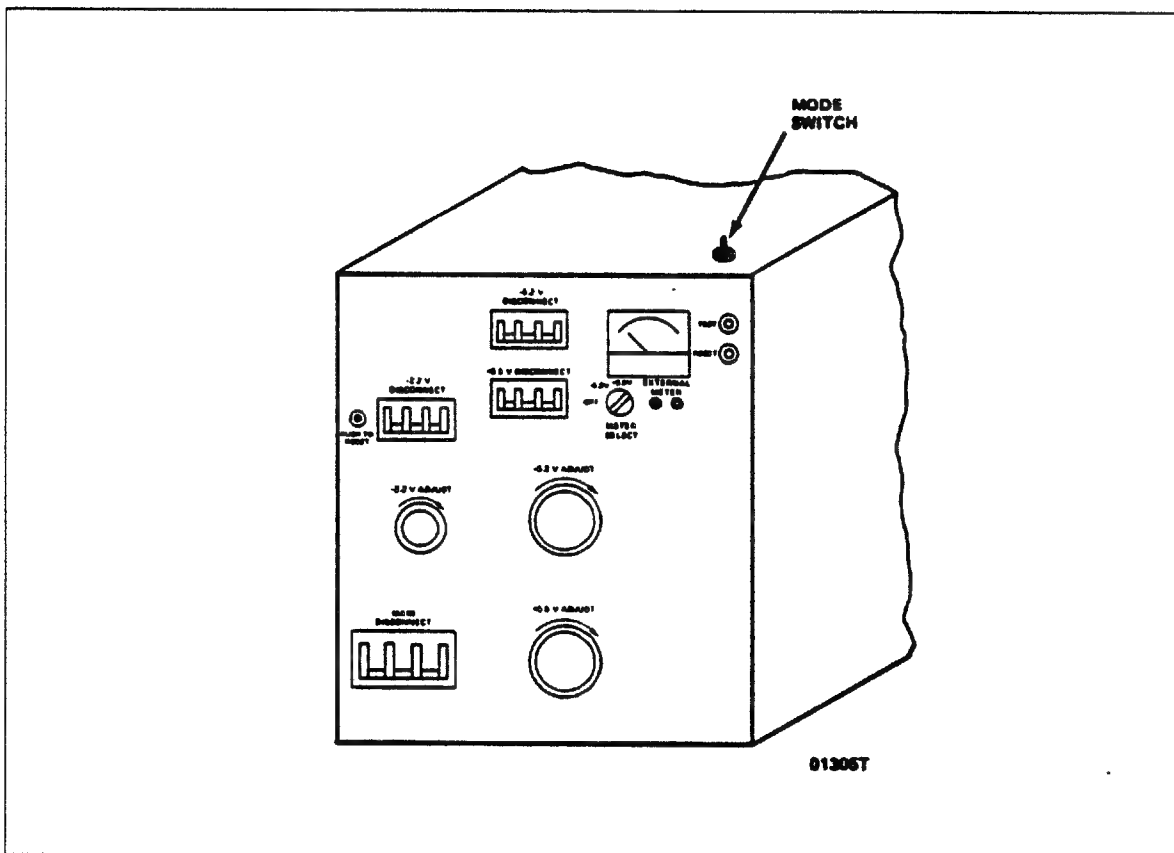


Figure 3-5. BS213-A CM 400-Hz Power Distribution Box

Remove Power From Water Cooling Unit

NOTE

IS A GH251-A, GH251-C, GH252-A, or GH252-C PRESENT?

- If yes, continue.
- If no, go to next procedure.

Use this procedure to remove 50/60 Hz power from the appropriate WCU. Refer to figure 3-6.

Procedure

1. Set INPUT POWER DISCONNECT circuit breaker on appropriate WCU control panel to OFF (or down) to remove power.

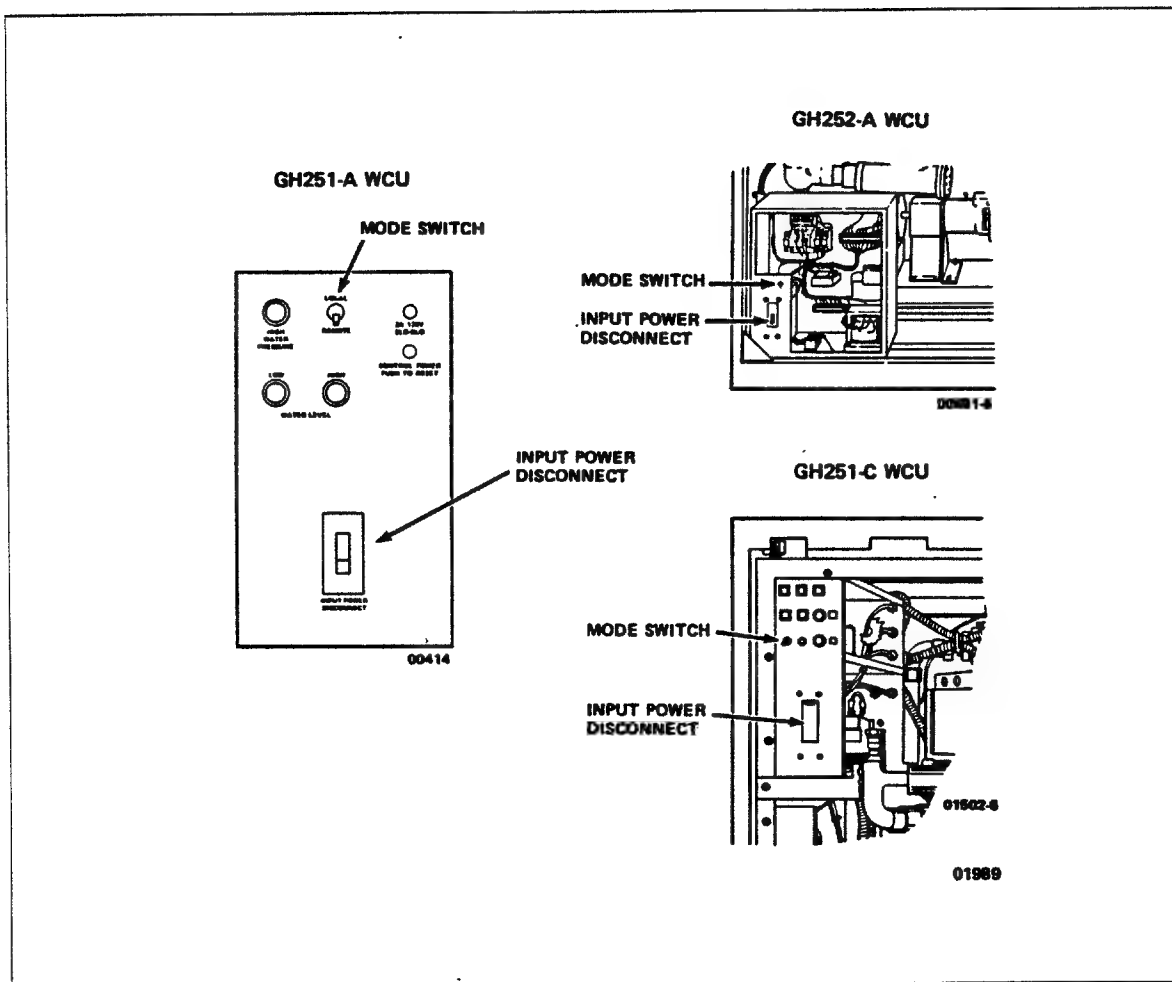


Figure 3-6. WCU Power Disconnect Circuit Breakers

Remove Site Power From Computer System

Use this procedure to remove the wall-mounted 50/60- and 400-Hz power from the computer system. Refer to Figure 3-7.

Procedure prerequisites

- 50/60-Hz cabinet power is off
- 400-Hz cabinet power is off

Procedure

- 1. Locate 400-Hz wall-mounted circuit breaker panel for computer system.
- 2. Set 400-Hz power wall-mounted circuit breaker(s) to OFF.
- 3. Locate 50/60-Hz wall-mounted circuit breaker panel for computer system.
- 4. Set 50/60-Hz wall-mounted circuit breaker(s) for computer system to OFF.
- 5. Set all applicable computer mainframe circuit breakers to off as follows:
 - For CPU's in 845/855 systems, set the 60-Hz and 400-Hz INPUT POWER DISCONNECTS or INPUT POWER DISCONNECTS, as appropriate, to off.
 - For CPU's in 840/850/860 systems, set all interbay power panel circuit breakers to OFF.

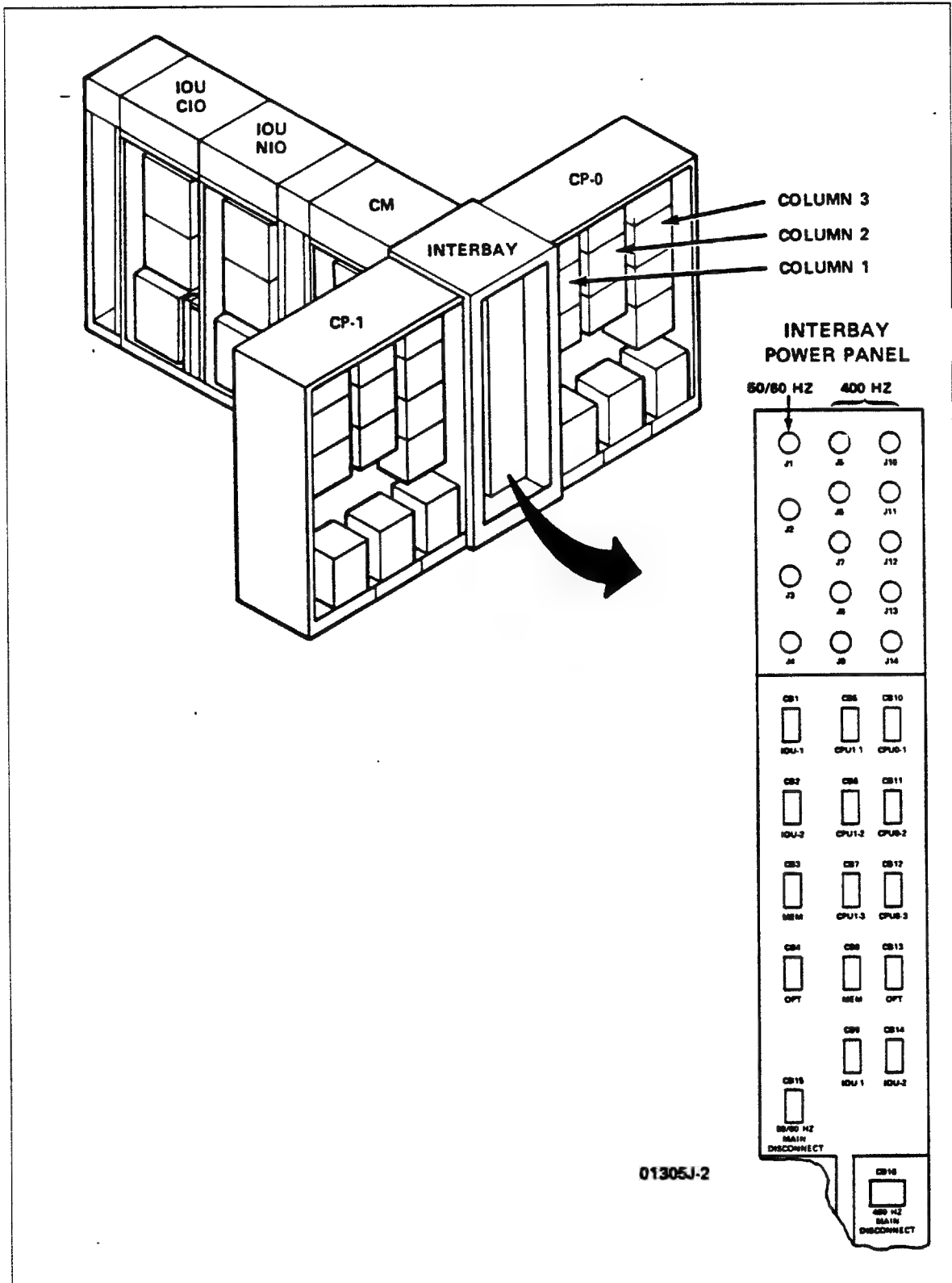


Figure 3-7. Removing Site Power From CP-0 in Typical 840, 850 or 860 Systems

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Preinstallation Procedures for CP-1 Cabinet

Use the Section 2 Site Preparation manual shipped in the preinstallation kit to ensure that all of the specific requirements for the system have been met. Pay special attention to conditions affecting the installation of CP-1 and ensure that:

- Site plumbing for CP-1 is located properly and in good condition.
- Floor cutouts are correct or,
- An outline of the CP-1 cabinet is drawn on or taped on the floor.
- Floor is level.

If not completed properly, these items may cause undesirable delays during installation procedures.

For complete preinstallation instructions refer either to chapter 5 or chapter 6, depending upon the type of water cooling unit to be installed.

To present the information in this chapter in a structured format, this page has been left blank.

Install Optional AD113-A Central Processor (CP-1) Cabinet

Installing the optional AD113-A Central Processor consists of the following tasks:

- Turn Off Water Supply to System
- Place and Bolt CP-1 Cabinet
- Connect CP-1 Water Hoses to Manifolds
- Connect CP-1 Clock Cables to CM
- Connect CP-1 Fault-Sense Cable to CM Multiplexer Board
- Connect CP-1 Local Memory Cables to CP-0 Interface Boards
- Connect CP-1 Power Cords to Interbay Power Panel

Turn Off Water Supply To System

Use this procedure to shut off the water to the entire system.

Procedure prerequisites

- 50/60-Hz power is off
- 400-Hz power is off

Procedure

- ___ 1. Locate site water supply and return shut-off valves that furnish water to system.
- ___ 2. Shut off water by closing site water supply and return shut-off valves.

Place and Bolt CP-1 Cabinet

Use this procedure to place and bolt the optional CP-1 cabinet at its predesignated floor location. This floor location defines power and cooling cutouts. In some installations, the locations of walls and the spacing of other equipment at the site may require that the installers vary the order of cabinet placement. Bolting the cabinets together occurs after their placement. Refer to figure 3-8.

NOTE

Perform these procedures with at least two installers, and preferably three.

Procedure prerequisites

- Level floor
- Precut cutouts completed in the raised-floor tiles for power and cooling connections
- A floor outline that defines the cabinet placements
- All cabinets aligned with each other and with the floor outlines.
- Necessary water hoses and manifolds are in place.
- Complete water system is off.

Tools/parts required

- Two Rol-a-lifts
- Two cam-action rollers, required for placement of optional cabinets
- Two heavy-gauge steel plates for use with cam-action rollers
- Bolting hardware: 1/4-20 bolts, 1/2 in and 1 in long; 1/4-20 nuts (shipped with cabinets)
- Two 3/8-in-drive socket wrench sets, one for each installer
- Drift pin

CAUTION

Be careful to insert Rol-a-lifts into end panel cutouts in cabinet frames, not at bottom edges of cabinet end panels. On some cabinets it is necessary to remove end panels when using the Rol-a-lifts.

Procedure

- 1. Place new cutout tiles for CP-1.
- 2. Using two Rol-a-lifts with padding between Rol-a-lifts and cabinet to protect cabinet, move CP-1 cabinet into position. Allow enough room between CP-1 cabinet and Interbay cabinet to remove Rol-a-lift.
- 3. Install cam-action rollers at end of CP-1 from which Rol-a-lift was removed.
- 4. Using Rol-a-lift still attached to opposite end of CP-1 cabinet and cam-action rollers, carefully move CP-1 cabinet into alignment with Interbay cabinet.
- 5. Remove Rol-a-lifts and cam-action rollers.
- 6. Open CM door closest to CP-1. Also open CP-1 front and rear doors to gain access to CP-1/interbay cabinet bolting areas.
- 7. Remove nuts from diagonal internal interbay shipping brace for better access, if still in place.
- 8. Push CP-1 cabinet up to and flush with interbay cabinet.
- 9. Store brace in bottom of interbay cabinet, so it is readily available for reinstallation if CP-1 and interbay system are moved later.
- 10. Align bolt holes of CP-1 and interbay cabinets, using drift pin as necessary.
- 11. Reach through interbay and CM cabinet openings and install bolts loosely at all fastening locations to maintain alignment of CP-1 and Interbay cabinets.
- 12. Tighten bolts.

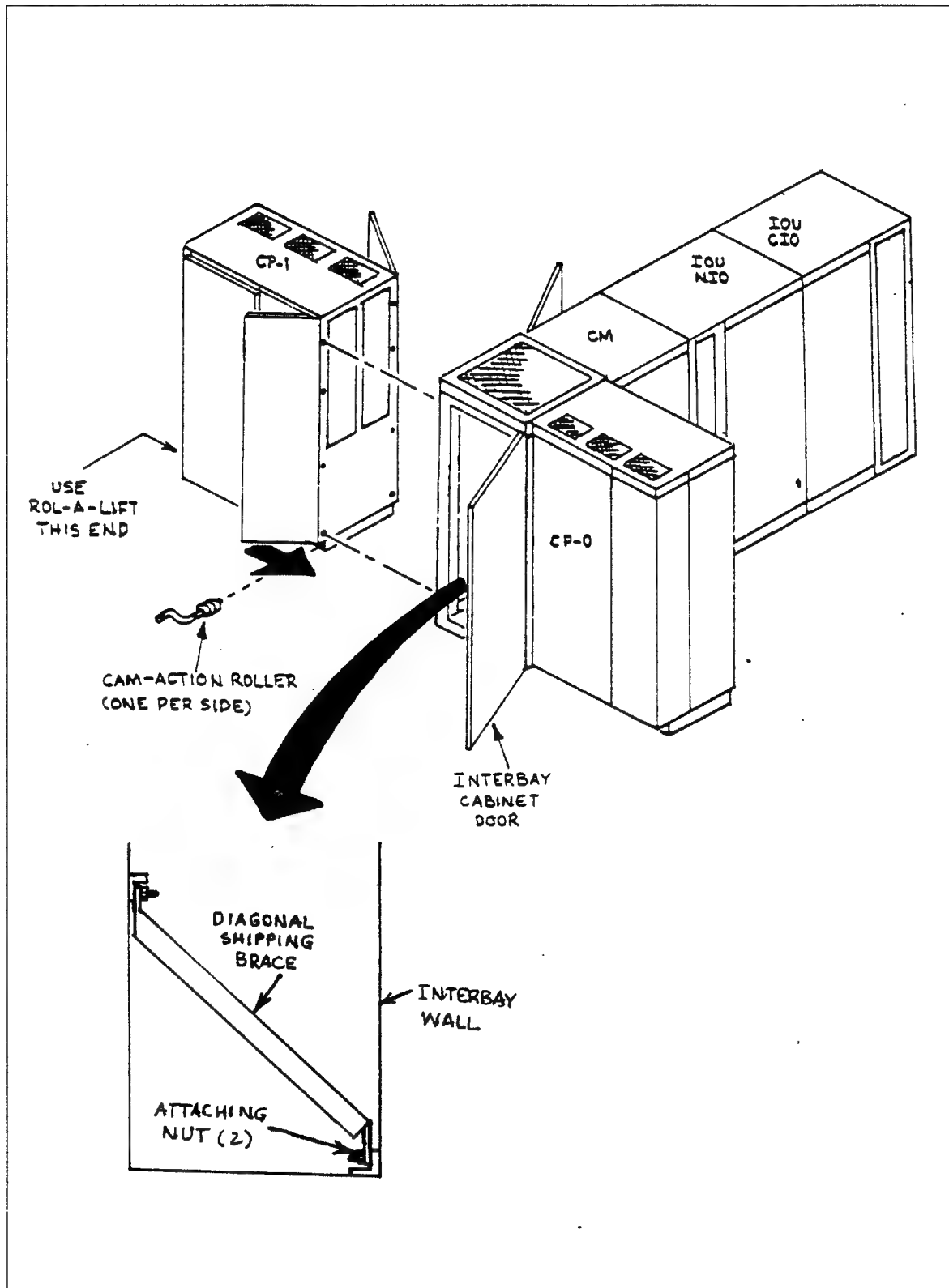


Figure 3-8. Installing CP-1 Cabinet

Connect CP-1 Water Hoses to Manifolds

Use this procedure to connect the three columns of CP-1 to hoses that connect to the supply and return water manifolds. Refer to figure 3-9.

Procedure prerequisites

- Bolting of CP-1 cabinets is complete.
- Water hoses have been routed under raised floor and connected between water cooling unit and up to the necessary manifolds.

Procedure

- 1. Remove raised-floor tiles between supply and return manifolds and CP-1 central processor water cutouts in floor.
- 2. Locate and verify that 1-in diameter, 3 m (10 ft) hoses are connected between three-port and five-port manifolds if the WCU is a GH252-A or GH252-C; otherwise, verify that hoses are connected between the WCU and the proper manifold.
- 3. Connect 3/4-in diameter, 2.4 m (8 ft) hoses to ports on water supply and return manifolds.
- 4. Route hoses under raised floor to water cutouts in floor for CP-1.
- 5. Pull water hoses up through floor cutouts and connect to CP-1 supply and return plumbing. Verify that hoses are connected to correct fittings.
- 6. Install Equipment No. label on five-port manifold. It is a self-stick label that is shipped in the early-shipment kit.
- 7. Install second Equipment No. label on one of the three-port water manifolds.
- 8. Install floor tiles.

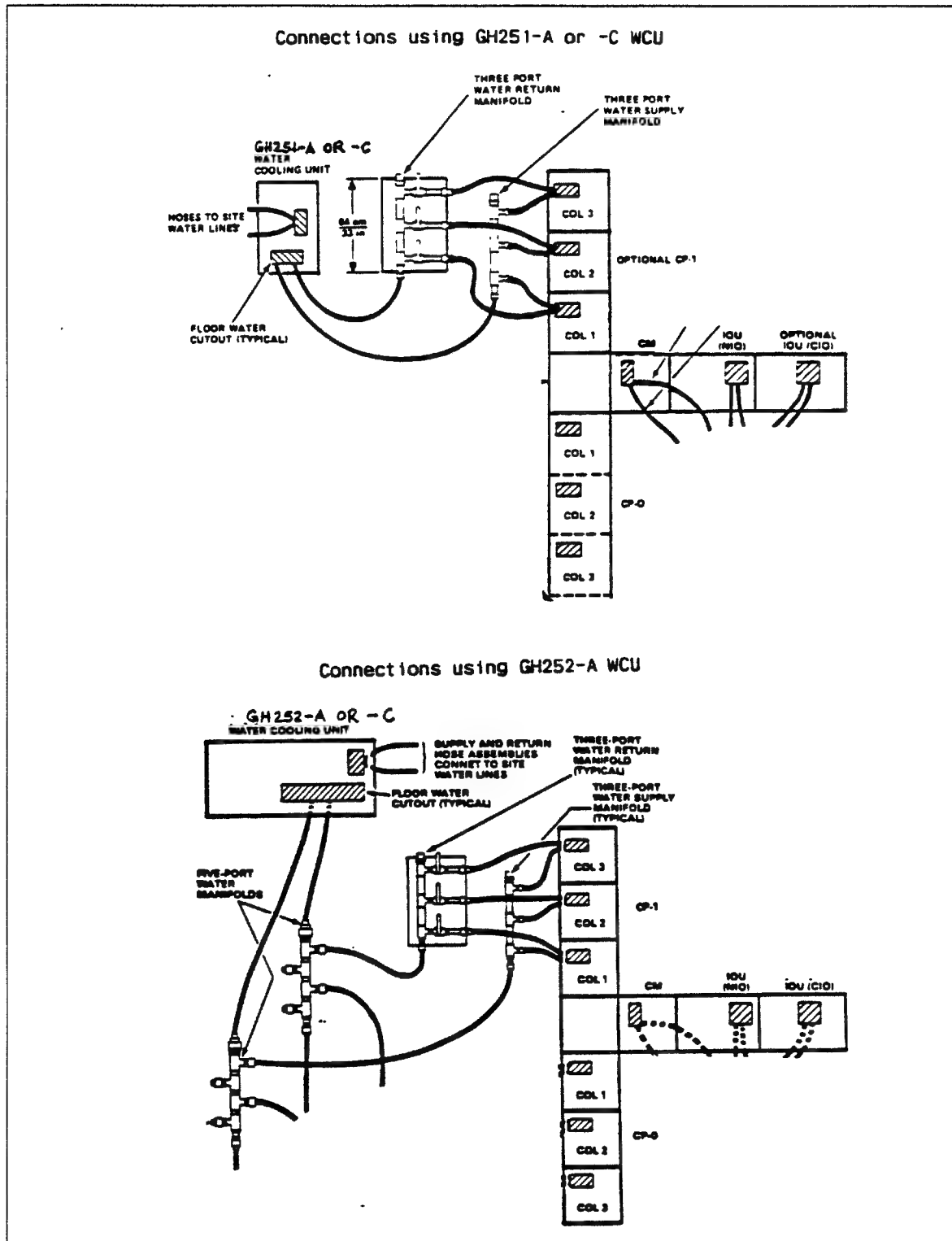


Figure 3-9. Water Hose Connections to CP-1

Connect CP-1 Clock Cables to CM

Use this procedure to route and connect clock cables from the CP-1 cabinet to the CM cabinet. Refer to figure 3-10.

Tools/parts required

- Clock terminator plugs (PN 53695211), as required
- Antistatic wrist strap

Procedure

CAUTION

Use antistatic wrist strap when connecting all data cables. This is essential for preventing damage to microcircuits.

Be careful when handling and connecting all cables to prevent damage to cable connections on connectors and to connector pins and jacks.

- ___ 1. Connect antistatic wrist strap from your wrist to frame ground.
- ___ 2. Locate two clock cables labeled M3-J43 or M3-J49 and M3-J45 in CP-1 cabinet.
- ___ 3. Cut any shipping restraints from these cables.
- ___ 4. Route cables through interbay into CM cabinet.

NOTE

If there are terminator plugs on CM clock connector panel connectors J43 or J49 and J45, remove them first.

- ___ 5. Connect cables to respectively labeled connectors on CM clock connector panel.
- ___ 6. Ensure that a clock terminator plug is installed on each unused connector on CM clock connector panel.

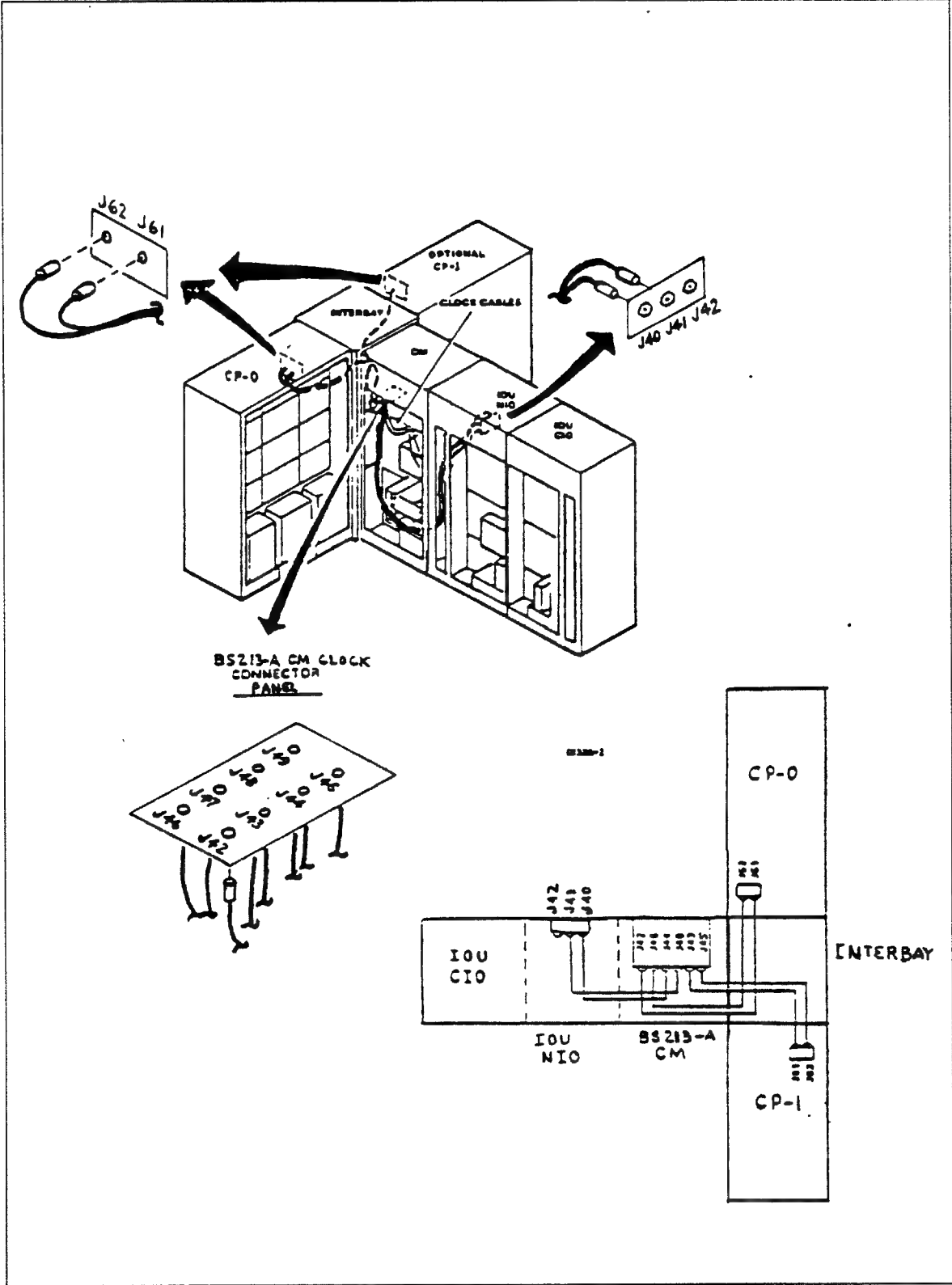


Figure 3-10. Clock Cable Connections

Connect CP-1 Fault-Sense Cable to CM Multiplexer Board

Use this procedure to route and connect the fault-sense cable from the CP-1 cabinet to the multiplexer board in the CM cabinet. Refer to figure 3-11.

Procedure prerequisites

- Bolting of the central computer units is complete.

Tools/parts required

- Antistatic wrist strap

Procedure

CAUTION

Use an antistatic wrist strap when connecting all data cables. This is essential for preventing damage to microcircuits.

Be careful when handling and connecting all cables to prevent damage to the cable connections on the connectors and to the connector pins and jacks.

- 1. Connect antistatic wrist strap from your wrist to frame ground.

CAUTION

Be careful to prevent bending or breaking of connector pins on the multiplexer board.

- 2. Locate fault-sense cable (P5/J5 in CP-1 cabinet). Cable has label for CM multiplexer board connector J6.
- 3. Route cable through interbay cabinet to CM multiplexer board. Connect cable to J6.

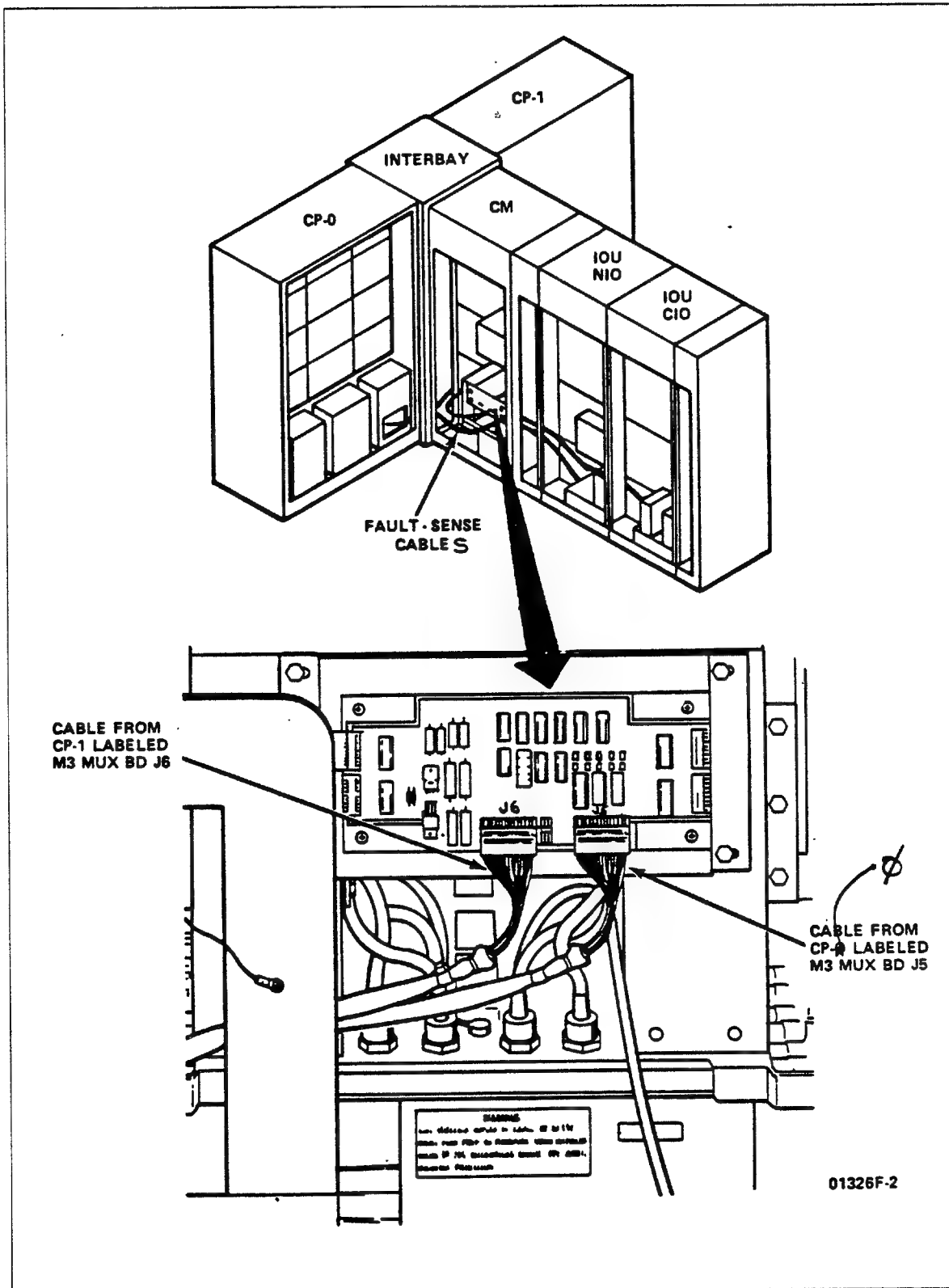


Figure 3-11. Fault-sense Cable Connections to CM Multiplexer Board

Connect CP-1 Local Memory Cables to CP-0 Interface Boards

Use this procedure to route the CP-1 cables through the interbay cabinet and connect them to the interface boards in CP-0. Refer to figure 3-12.

Tools/parts required

- Diagonal cutter
- 3/16-in socket wrench
- Antistatic wrist strap

Procedure

CAUTION

Use antistatic wrist strap when connecting all data cables. This is essential for preventing damage to microcircuits.

Be careful when handling and connecting all cables to prevent damage to the cable connections on the connectors and to connector pins and jacks.

- 1. Connect antistatic wrist strap from your wrist to frame ground.
- 2. Locate cable bundles in CP-1 column 1 that have CP-0 connector testination labels.
- 3. Cut shipping restraints from cables.
- 4. Route cables into interbay behind vertical interbay connector panel to make connections to upper and lower CP-0 column 1 interface boards.
- 5. Connect cables to ZIF cages A and C as listed in table 3-1.
 - a. Use a 3/16-in wrench to remove connector retainers to allow making cable connections to interconnect boards.
 - b. Plug in connectors with white wires up and orange wires down.
 - c. Install connector retainers.
- 6. Use tie raps to bundle cables to power bus board to relieve weight of cables from connectors.
- 7. Ensure that cable connections to CP-0 column 1, ZIF cage interconnect boards, fit tightly on boards.

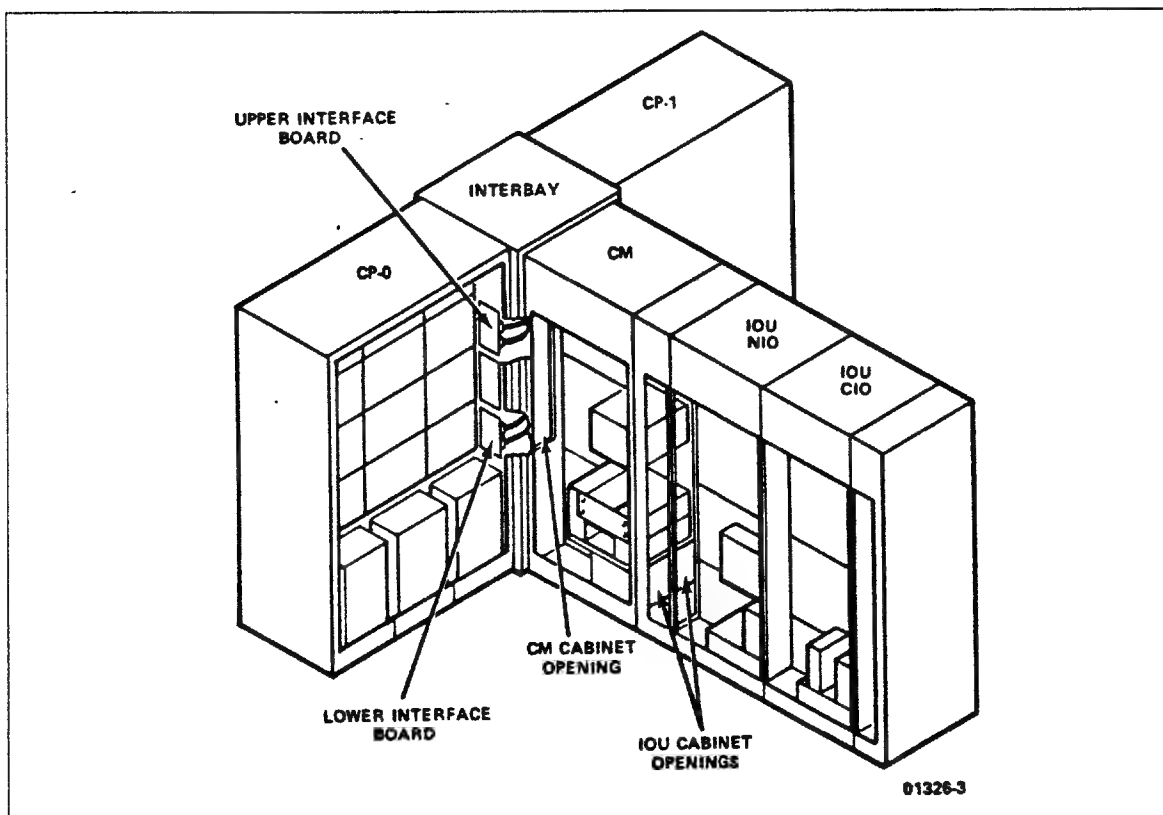
Table 3-1. CP-1 Local Memory Cables to CP-0 Interface Boards

Origin: CP-1	Destination: CP-0	Origin: CP-1	Destination: CP-0
B1BA3	C1AL4	B1AH3	A1BH4
B1BF4	C1AL5	B1AG3	A1BN3
B1BW3	C1AG4	B1AW3	A1BH3
B1BT3	C1AH4	B1AT3	A1BJ3
B1BU3	C1AJ4	B1AU3	A1BL3
B1BV3	C1AK4	B1AV3	A1BM3
B1BW4	C1AG5	B1AW4	A1BJ4
B1BT4	C1AH5	B1AT4	A1BK4
B1BU4	C1AJ5	B1AU4	A1BL4
B1BV4	C1AK5	B1AV4	A1BM4
		B1AB3	A1BN4

Notes:

Connector definition example for B1AH3:

- B is ZIF cage (A, B, or C).
- 1 is column 1.
- A is interconnect board (A or B).
- H3 is connector location on interconnect board.

**Figure 3-12. Connecting CP-1 Local Memory Cables to CP-0 Interface Boards**

CHANGE CP-0 BACKPANEL WIRING

Use this procedure to install CP-0 backpanel wires for the CP-1 option.

NOTE

IS CP-1 PRESENT?

o If no, go to next procedure

o If yes, continue

Tools/parts required

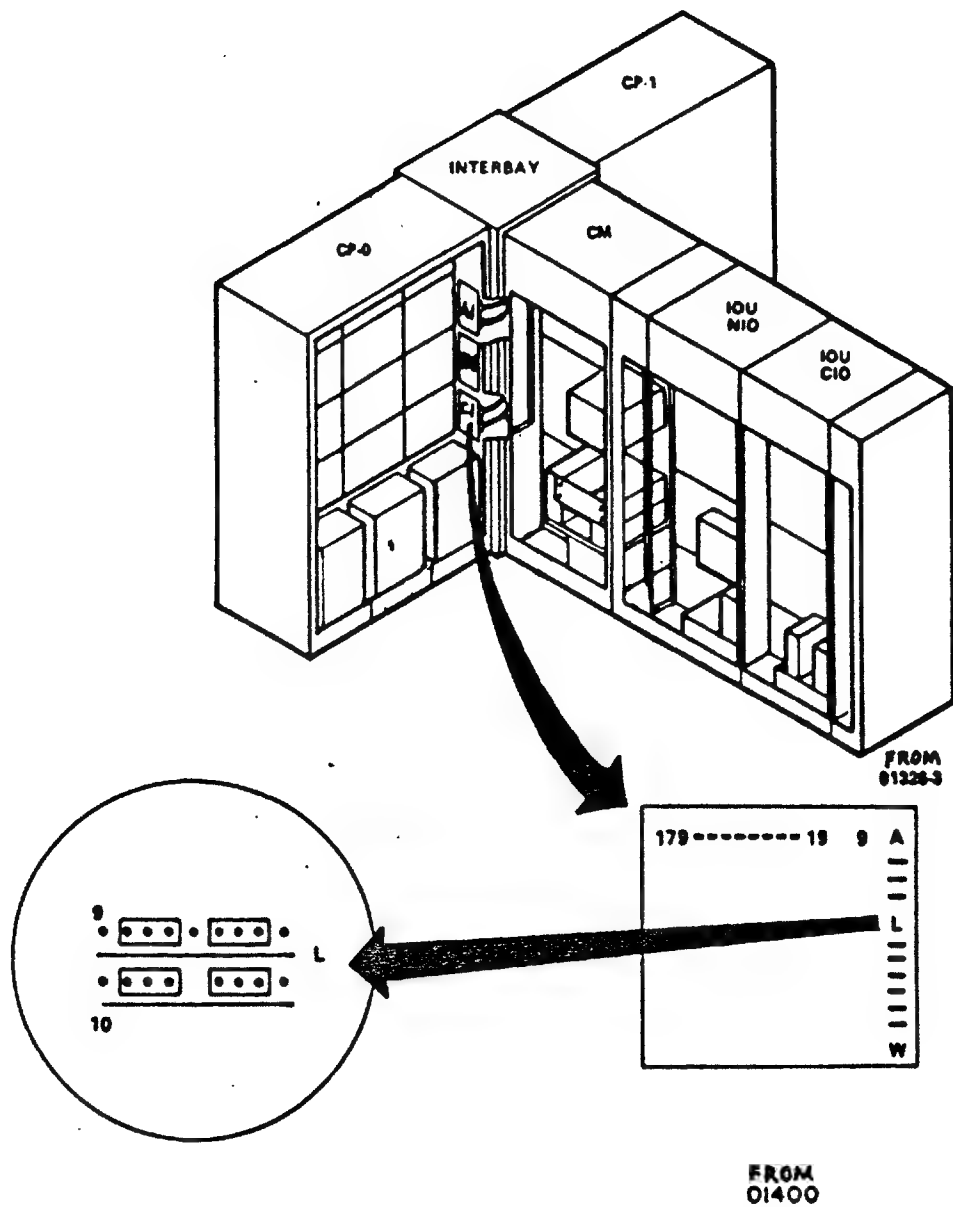
o Needle-nose pliers

Procedure

1. Install the following CP-0 backpanel wires (table 3-2 and figure 3-12A).

Table 3-2. Installed CP-0 ZIF Cage Backpanel Wires for CP-1 Option

CP ZIF Cage Backpanel Board Location	to	CP ZIF Cage Backpanel Board Location	Length (inches)
A1D - PIC - 113	to	A1B - PIC - 133	15
C1D - PIC - 117	to	C1L - PIC - 162	15
A1D - PIC - 071	to	C1E - PIC - 003	35



EXAMPLE OF NOMENCLATURE

CIL - PIC - 009

CI = ZIF cage C1

L = Row L within ZIF Cage C1

PIC = C indicates backpanel

009 = Pin location 009

Figure 3-12A. CP-0 ZIF Cage Backpanel Board Designators

Connect CP-1 Radial Interface Cable

Use this procedure to route and connect a single radial interface cable from CP-1 column 1 to IOU backpanel A. Refer to figure 2-13.

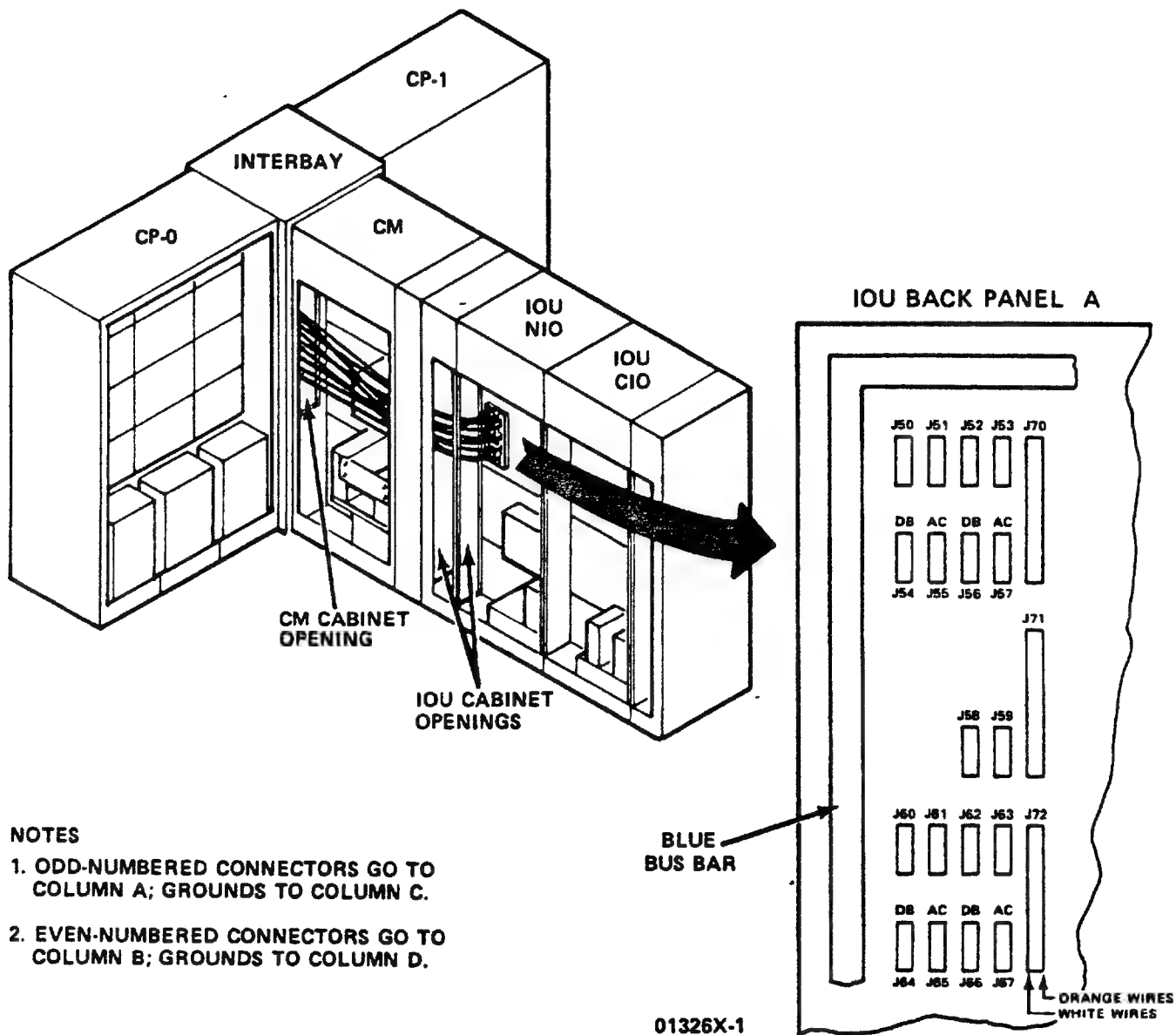
3-12B

Tools/parts required

- 7VXO, 136-pack (shipped with CP-1)

Procedure

- 1. Locate cable inside CP-1 that has unconnected connector labeled J72. Other end of cable originates at CP-1 ZIF cage locations C1AD3, C1AD4, and C1AD5.
- 2. Route cable through interbay and CM to IOU backpanel A. Route only enough cable to reach backpanel.
- 3. Connect J72 cable from CP-1 to IOU backpanel A connector J72, positioning connector so white wires are on B-pin column and orange wires are on A-pin column.



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3-12B

Figure 3-12B Connecting CP-0 Data Cables to IOU NIO

Connect CP-1 Power Cords To Interbay Power Panel

Use this procedure to route and connect the CP-1 power cords to the interbay power panel. Refer to figure 3-13.

Procedure prerequisites

- 50/60-Hz and 400-Hz power is off
- Cabinet bolting procedures complete

Procedure

- 1. Uncoil yellow power cord closest to interbay in CP-1.
- 2. Route cord into the interbay.
- 3. Mate its connector with proper interbay power panel connector. The cord is labelled with a designation as follows:

Power Cord Label	Mates with Interbay Power Panel Connector
COL 1 400 Hz	J5
COL 2 400 Hz	J6
COL 3 400 Hz	J7

NOTE

Figure 3-13 shows location of various interbay power panel connectors. The x shown within connectors J5, J6, and J7 on the figure indicates where power cords for COL 1, COL 2, and COL 3 connect.

- 4. Lock connector by twisting it about 1/8th turn clockwise.
- 5. Repeat steps 1 through 4 for remaining two power cords.

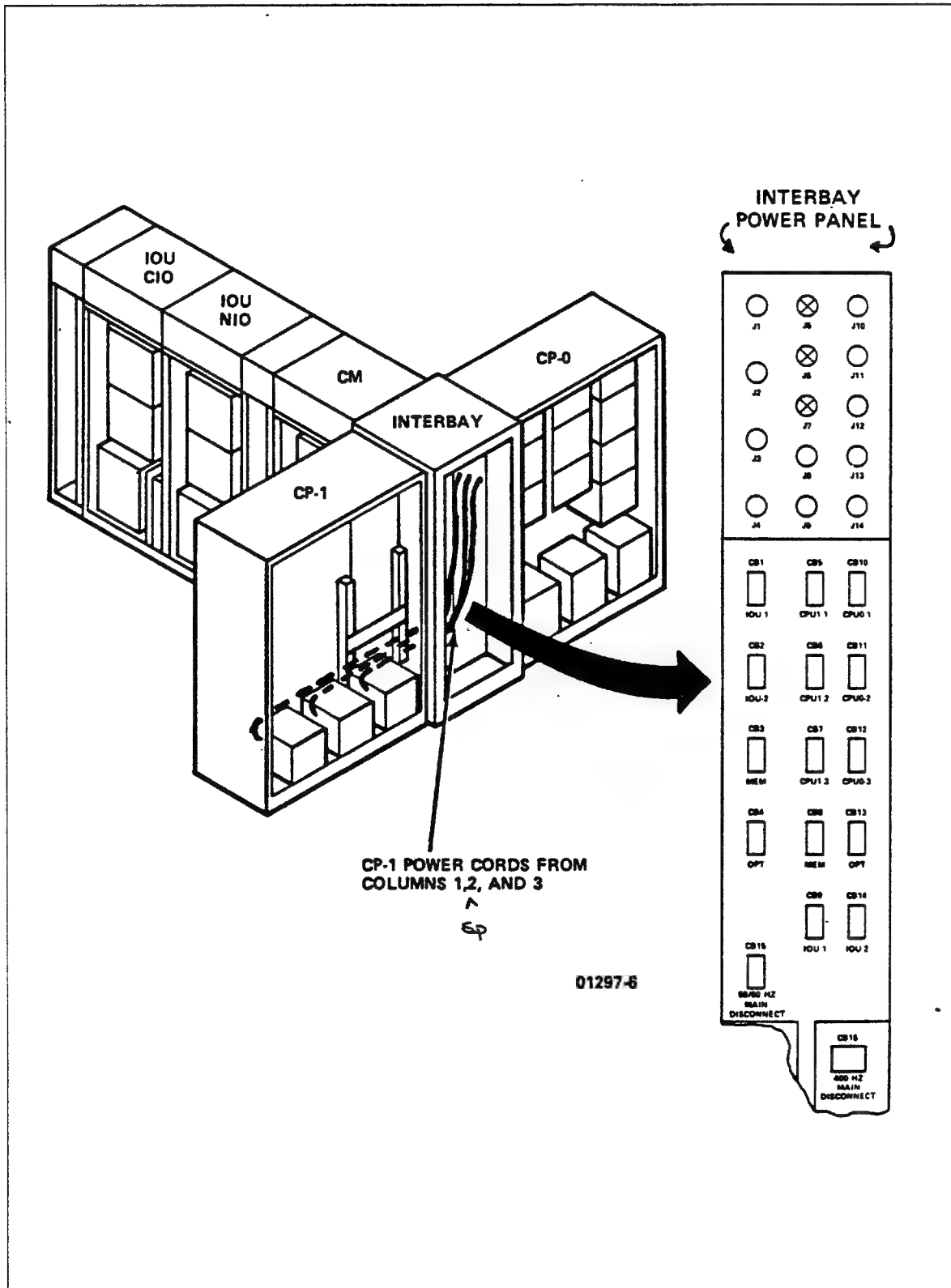


Figure 3-13. Routing/Connecting CP-1 Power Cords to Interbay

Prepare Water Cooling Unit

If a WCU is to be installed or replaced, it can be performed at this point in the installation process.

NOTE

IS A GH251-C 102-L/min (27-gal/min) WCU TO BE INSTALLED?

- *If yes, complete procedures of section 5 now.*
 - *If no, continue.*
-

NOTE

IS A GH252-A OR GH252-C 220-L/min (58-gal/min) WCU TO BE INSTALLED?

- *If yes, complete procedures of section 6 now.*
 - *If no, continue.*
-

Apply System Power

Applying system power consists of starting the M-G set and water cooling unit(s) from the SPM or SPCP, turning on power to the central processor cabinets, and adjusting cabinet voltages as described in the following procedures:

WARNING

In case of a personnel or equipment emergency, press the SYSTEM EMERGENCY switch on the front of the interbay cabinet to remove system power.

- Apply M-G set power from SPM or SPCP.
- Apply M-G set power from SPCP (845/855 systems only).
- Apply power and adjust voltages for CP-1.
- Check water flow rates.

NOTE

Before attempting to apply system power, verify that all mode or LOCAL/REMOTE switches on the various power distribution boxes, etc., are in the REMOTE positions.

Apply M-G Set Power From SPM

Use this procedure to start the M-G set power from the controls on the system power monitor (SPM). Refer to figures 3-14 and 3-15.

NOTE

DOES SYSTEM USE AN SPM?

- *If yes, continue.*
 - *If no, go to the next procedure.*
-

Procedure prerequisites

- M-G set power was previously checked out and run in the local mode of operation. M-G set is set for remote operation.
- M-G set output voltages were previously adjusted.
- All wall-mounted disconnect boxes that control power from the M-G set to the computer system are set to OFF.
- Switch groups SN1, SN2, and SN3 in the SPM were set to system conditions during preinstallation procedures.

Procedure

- 1. Remove two retaining screws and open SPM door.
- 2. Verify that switches SN3-8 and SN3-9 are set to OFF. If no equipment connects to J5 and J6 on bottom of SPM, set these switches to ON.
- 3. Set switches SN2-1 through SN2-4 as needed, if any changes were made to the M-G set configuration. The settings are:

SN2-1	Selects M-G set 1	Switch setting is determined by site configuration.
SN2-2	Selects M-G set 2	Selection of M-G set 1 or 2 is required. ON position
SN2-3	Selects M-G set 3	enables selection; OFF disables selection. Unused
SN2-4	Selects M-G set 4	M-G switches may be left in the ON position.
- 4. Close SPM door and install retaining screws.
- 5. Set wall-mounted circuit breaker that controls 50/60-Hz power to SPM to ON. This circuit breaker may not be present at all sites.

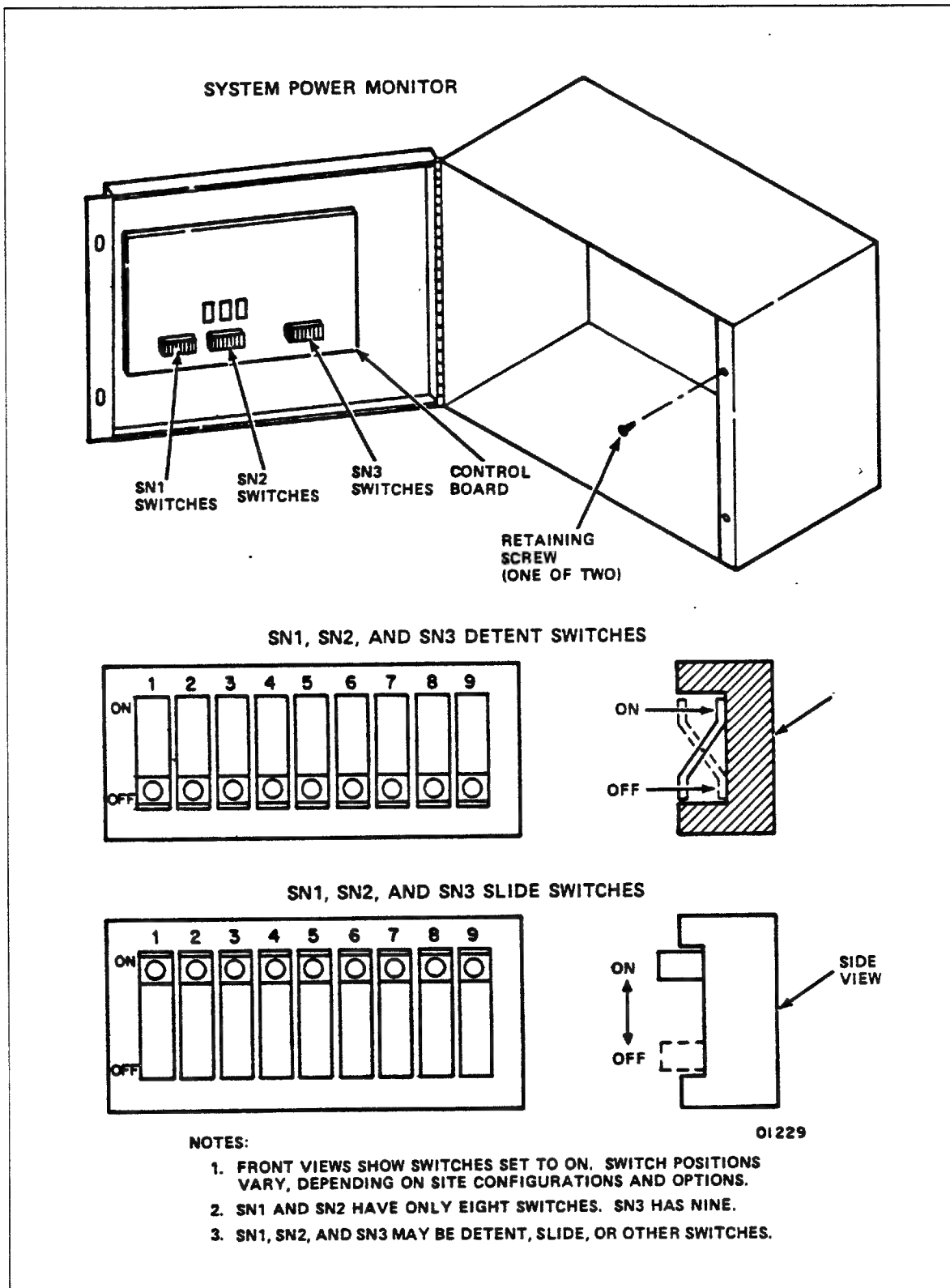


Figure 3-14. Checking SPM Switches SN1, SN2, and SN3

- ___ 6. Set keyswitch on side of SPM to LOCAL.
- ___ 7. Set SYSTEM EMERGENCY switch on interbay to ON.
- ___ 8. Set SYSTEM DISCONNECT switch on left side of SPM to ON. This applies 50/60-Hz power to SPM.

NOTE

Switch SN2-8 in SPM must be set to OFF or COLUMN FAULT indicator lights.

- ___ 9. Press and release LOCAL START switch on front of SPM.

NOTE

Allow 1 min for MG to obtain full output voltage.

- ___ 10. Verify that SYSTEM ON and ROOM ON indicators on SPM are on and SPM cooling fan is running.
- ___ 11. Set selector switch to select system MG being used: MG 1, 2, 3, or 4.
- ___ 12. Set function switch on front of SPM to MG PHASE 1. Verify that MG phase 1 voltage display is between 118 V and 120 V.
- ___ 13. Set function switch to MG PHASE 2. Verify that MG PHASE 2 voltage display is between 118 V and 120 V.
- ___ 14. Set function switch to MG PHASE 3. Verify that MG PHASE 3 voltage display is between 118 V and 120 V.
- ___ 15. Adjust VOLTAGE ADJUST setscrew on front of SPM, if necessary, to obtain correct MG phase voltages.
- ___ 16. Repeat steps 10 through 14 for other M-G sets in system, if applicable.
- ___ 17. Set mode switch on each WCU (as applicable) as follows:
 - On GH251-A, GH251-C, and GH252-A: set mode switch to REMOTE.
 - On GH252-A or GH252-C only: Set MANUAL/AUTO switch to MANUAL.
- ___ 18. Press STOP switch on front of SPM, and verify powerdown of M-G set and water cooling unit.
- ___ 19. Wait 5 min for MG to power down. Press LOCAL START switch on front of SPM to restart M-G set and water cooling unit. Allow M-G power to remain on for following checks.

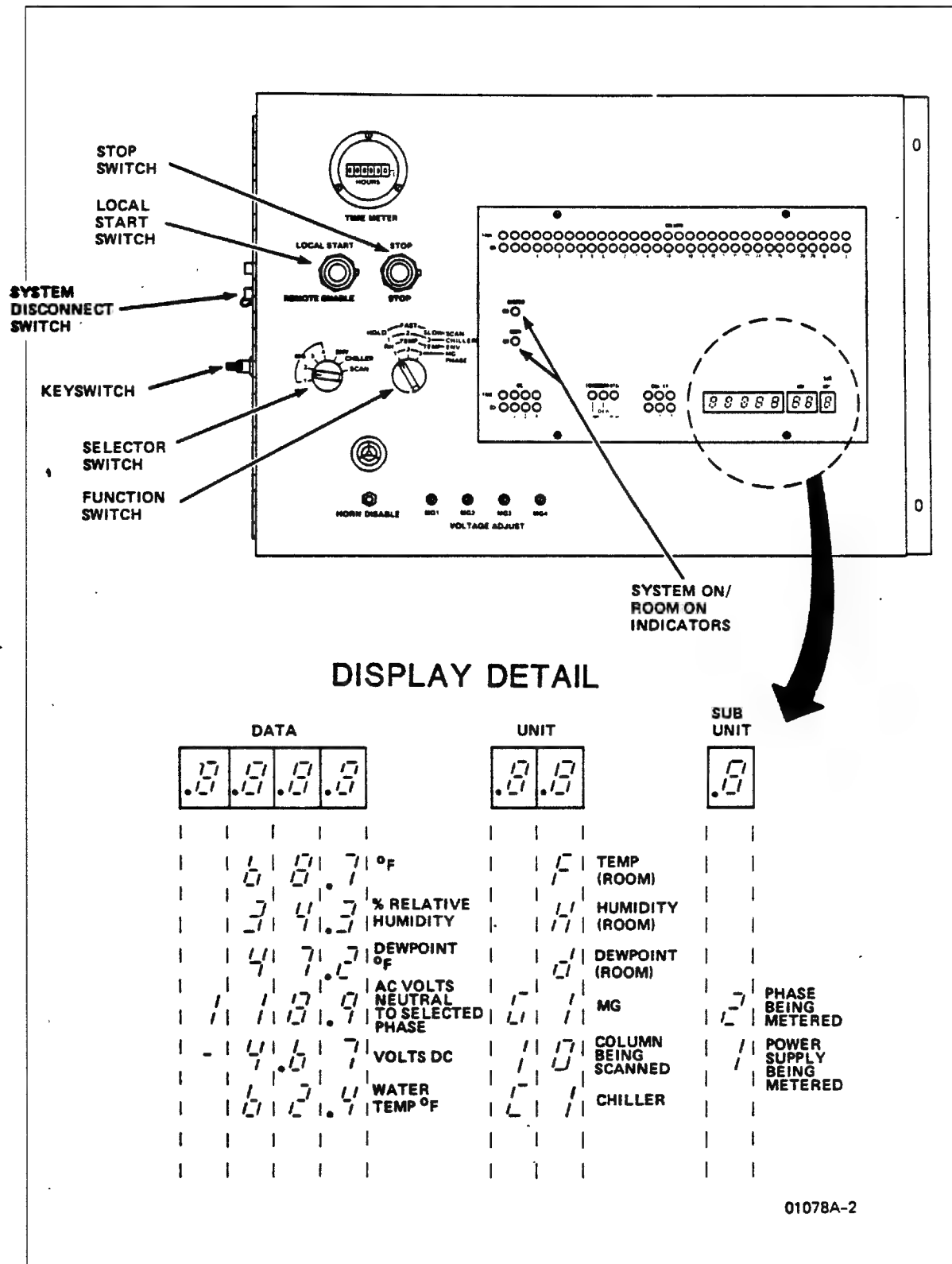


Figure 3-15. Applying M-G Set Power From SPM

Apply M-G Set Power From SPM

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Apply M-G Set Power From SPCP (845/855 Systems Only)

Use the following procedure to apply 400-Hz power to the M-G set from the SPCP. Refer to figure 3-16.

Procedure prerequisites

- M-G set power was previously checked out and run in the local mode of operation. M-G set is set for remote operation.
- M-G set output voltages were previously adjusted.
- All wall-mounted disconnect boxes that control power from the M-G set to the computer system are set to OFF.

Procedure

1. Set 400-Hz wall-mounted circuit breaker for SPCP to ON.
2. Press and release REMOTE ENABLE/LOCAL START switch on front of SPCP. M-G set starts; POWER ON indicator on front of SPCP lights.
3. Allow M-G set to operate until percentage meter on SPCP stabilizes at 0 percent.

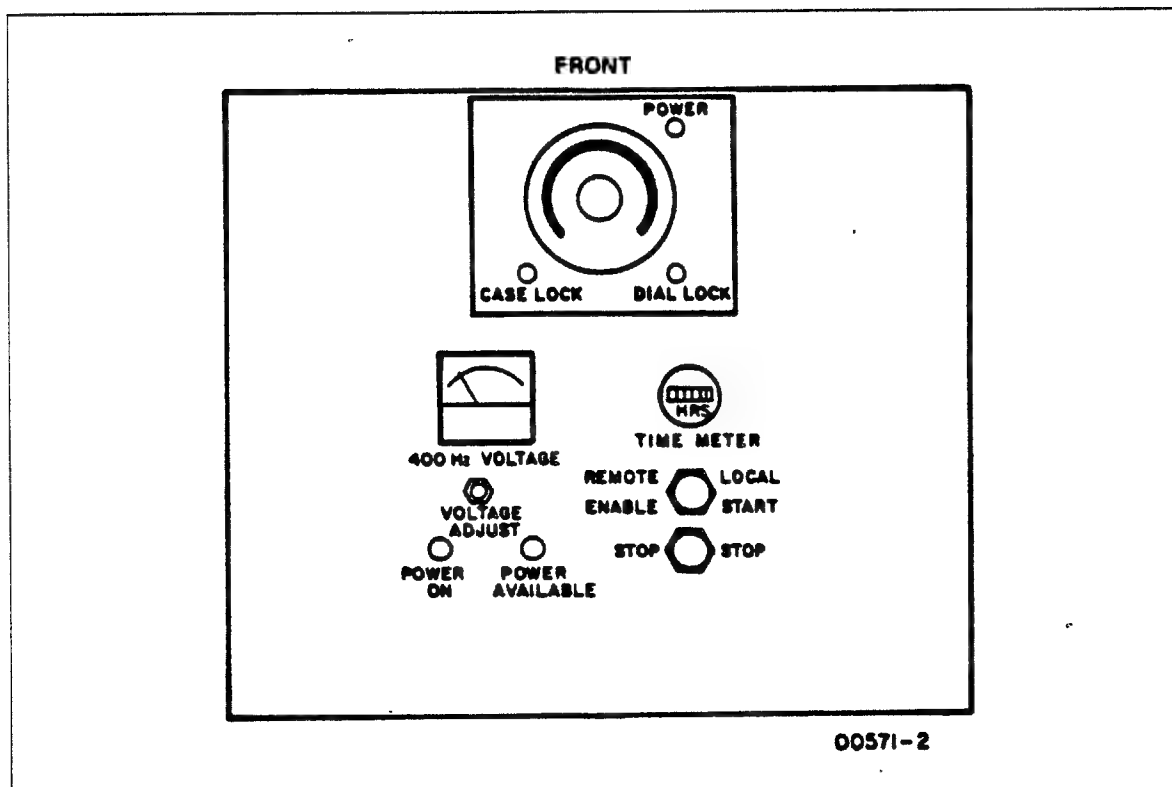


Figure 3-16. Applying M-G Set Power From SPCP

Apply Power and Adjust Voltages For CP-1

Use this procedure for the first application of 400-Hz power to the CP-1 cabinet and for the adjustment of logic voltages in CP-1 cabinet. Refer to figures 3-17 and 3-18.

Procedure prerequisites

- All previous installation and checkout procedures have been completed
- SPM or SPCP is on
- M-G set is on
- 400-Hz wall-mounted power is available to CP-1.

Tools/parts required

- Digital multimeter, John Fluke Model 8020A or equivalent

Procedure

- ___ 1. Set following circuit breakers, voltage adjust knobs, and switches at bottom of each CP column as follows:
 - ___ a. Mode switch to LOCAL
 - ___ b. 400-Hz DISCONNECT to OFF
 - ___ c. 2.2 V DISCONNECT to OFF
 - ___ d. 4.7 V DISCONNECT to OFF
 - ___ e. 2.2 V adjust knob fully counterclockwise
 - ___ f. 4.7 V adjust knob fully counterclockwise

NOTE

The following steps are for CP column 1. Repeat them for columns 2 and 3.

- ___ 2. Column 1 - set CPU1-1 400-Hz circuit breaker (CB5) on interbay power panel to ON.
- ___ 3. Column 2 - set CPU1-2 400-Hz circuit breaker (CB6) on interbay power panel to ON.
- ___ 4. Column 3 - set CPU1-3 400-Hz circuit breaker (CB7) on interbay power panel to ON.

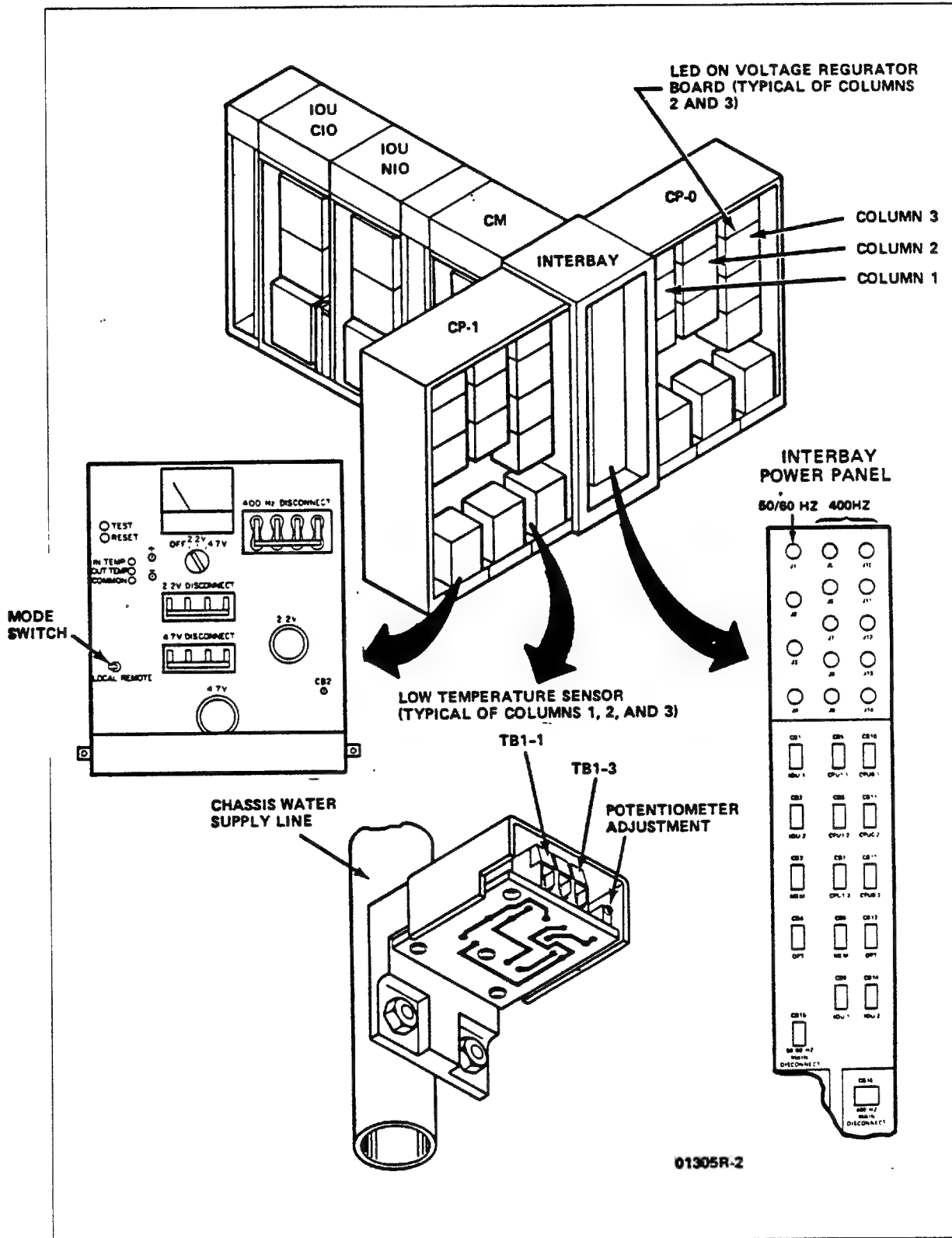


Figure 3-17. CP-1 Power Controls and Adjustments

- ___ 5. Set 400 Hz DISCONNECT circuit breaker at power distribution box to ON.
 - ___ a. Visually check that POWER SUPPLY OFF indicator, located on top of 400-Hz power distribution box, is on. All column indicators are off.

NOTE

This substep applies to columns 2 and 3 only.

- ___ b. Visually check that voltage regulator board light-emitting diode (LED), located on left edge of board, is on.
- ___ 6. Set 2.2 V DISCONNECT and 4.7 V DISCONNECT circuit breakers to ON.

CAUTION

Use voltages indicated by V1 V2 V3 label located on power distribution box when adjusting or inspecting -2.2 V, -4.7 V, and +5.0 V terminator and logic voltages on the CP, CM, and IOU columns. If column power distribution box does not display V1 V2 V3 label, use voltages indicated in this manual.

- ___ 7. Press and release RESET switch on front of power distribution box .
 - ___ a. Verify that POWER SUPPLY OFF indicator is off.
 - ___ b. Verify that POWER ON indicator is on.
- ___ 8. Set multimeter to scale that measures 2 V dc to 5 V dc.
- ___ 9. Connect multimeter test leads to + (red) and - (blue) test points below percentage meter on column power supply.
- ___ 10. Mechanically zero percentage meter indicator as follows:
 - ___ a. Set meter select switch to OFF.
 - ___ b. Turn screw on front of percentage meter, if necessary, to align meter indicator at mechanical zero mark at far left of scale.
- ___ 11. Adjust power supply 4.7 V and percentage meter as follows:
 - ___ a. Set meter select switch to 4.7 V.
 - ___ b. Turn 4.7 V adjust knob on front of power distribution box slowly until multimeter indicates 4.8 V dc.
 - ___ c. Use a nonmetallic tool to adjust meter, if necessary, to 0. Do this by sliding power distribution box outward, removing top mesh cover, and adjusting 4.7 V METER ADJ screw on top of box.
- ___ 12. Adjust power supply 2.2 V and percentage meter as follows:
 - ___ a. Set meter select switch to 2.2 V.
 - ___ b. Turn 2.2 V adjust knob on front of power distribution box slowly until multimeter indicates 2.25 V dc (2.85 V dc for columns 2 and 3).

NOTE

If 2.2 V DISCONNECT circuit breaker trips to OFF, perform these steps:

- 1) Turn 2.2 V adjust knob a few degrees in a clockwise direction past trip point.
- 2) Reset 2.2 V DISCONNECT circuit breaker.

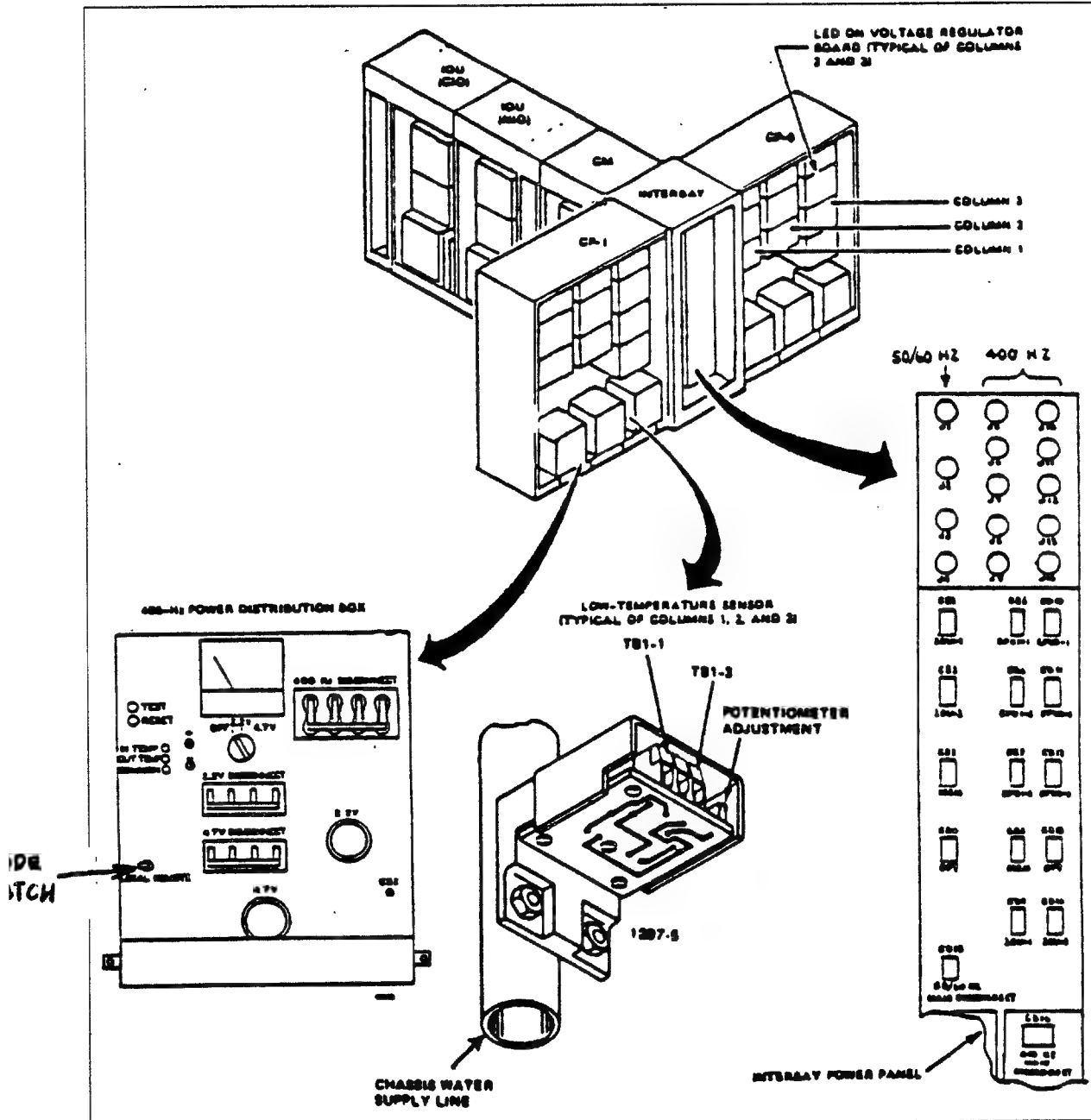


Figure 3-18. CP-1 Power Controls and Adjustments

To present the information in this chapter in a structured format,
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- ___ 3) Push and release RESET switch on front of power distribution box.
- ___ 4) Turn 2.2 V adjust knob clockwise until multimeter reads 2.25 V dc (2.85 V dc for columns 2 and 3).
- ___ c. Use a nonmetallic tool to adjust meter, if necessary, to 0. Do this by sliding power distribution box outward, removing top mesh cover, and adjusting 2.2 V METER ADJ screw at top of box.
- ___ 13. Disconnect multimeter test leads from power distribution box.
- ___ 14. Check low-temperature sensor voltage and, if necessary, adjust it as follows:
 - ___ a. Set multimeter to a scale that measures 10 V dc using the next meter scale greater than 10 V dc.
- CAUTION**

Place multimeter leads lightly on TB1 to prevent bending of the low-temperature assembly and a possible erroneous voltage reading.

- ___ b. Place meter negative (-) lead through hole in cover on low-temperature sensor terminal TB1-1 and positive lead (+) through hole in cover on terminal TB1-3.
- ___ c. Observe multimeter reading. If voltage is not within 9.9 to 10.1 Vdc, correct it by adjusting potentiometer on low-temperature assembly.
- ___ d. Remove multimeter leads from TB1.
- ___ 15. Set mode switch on front of power distribution box to REMOTE.
- ___ 16. Replace top mesh cover, and slide power distribution box back into column if meter adjustment was necessary. Do not reinstall retaining screws at front of box.
- ___ 17. Repeat steps 2 through 16 for CP-1 columns 2 and 3.

Check Water Flow Rates

Use this procedure to check settings of the water flow rates through the IOU, central memory and central processor columns after stabilization of the water flow through the computer system. Refer to figure 3-19.

Procedure prerequisite

- All columns of CP-1 are installed.

Procedure

- 1. Adjust control valves on the water flow meters on under-floor water manifolds as necessary, to obtain the following flow rates:
 - a. CP-0 and CP-1 column 1 flow rates: 11.3 L (3 gal) per min.
 - b. CP-0 and CP-1 column 2 flow rates: 11.3 L (3 gal) per min.
 - c. CP-0 and CP-1 column 3 flow rates: 15.1 L (4 gal) per min.
 - d. CM column flow rate: 7.6 L (2 gal) per min.
 - e. IOU NIO cabinet, 2-coil units: 15.1 L (4 gal) per min or IOU NIO cabinet, 3-coil units: 22.7 L (6 gal) per minute.
 - f. IOU CIO cabinet, 2-coil units: 15.1 L (4 gal) per min or IOU CIO cabinet, 3-coil units: 22.7 L (6 gal) per minute.
 - g. Adjust control valves as necessary to correct water flow rates.
- 2. Install all covers on flow meters.
- 3. Check water cooling unit for following gauge readings:

- a. PUMP OUTLET PRESSURE gauge (in psig):

Power	GH251-A/B	GH251-C	GH252-A	GH252-C
60 Hz:	276-400 kPa	483-685 kPa	276-379 kPa	331-428 kPa
	↙(40-58 psi)	↙(70-92 psi)	↙(40-55 psi)	↙(48-62 psi)
50 Hz:	173-241 kPa	276-414 kPa	173-241 kPa	241-310 kPa
	↙(25-35 psi)	↙(40-60 psi)	↙(25-35 psi)	↙(35-45 psi)

- b. CHASSIS WATER TEMPERATURE gauge:

16.7°C to 18.3°C (62°F to 65°F).
- c. CHILLED WATER TEMPERATURE gauge:

4.4°C to 10.0°C (40°F to 50°F).
- 4. If adjustments are required to obtain correct pressure and temperature refer to either of the WCU installation chapters (5 or 6) under the heading, Check Water Cooling Unit Temperature, Pressure, and Flow.

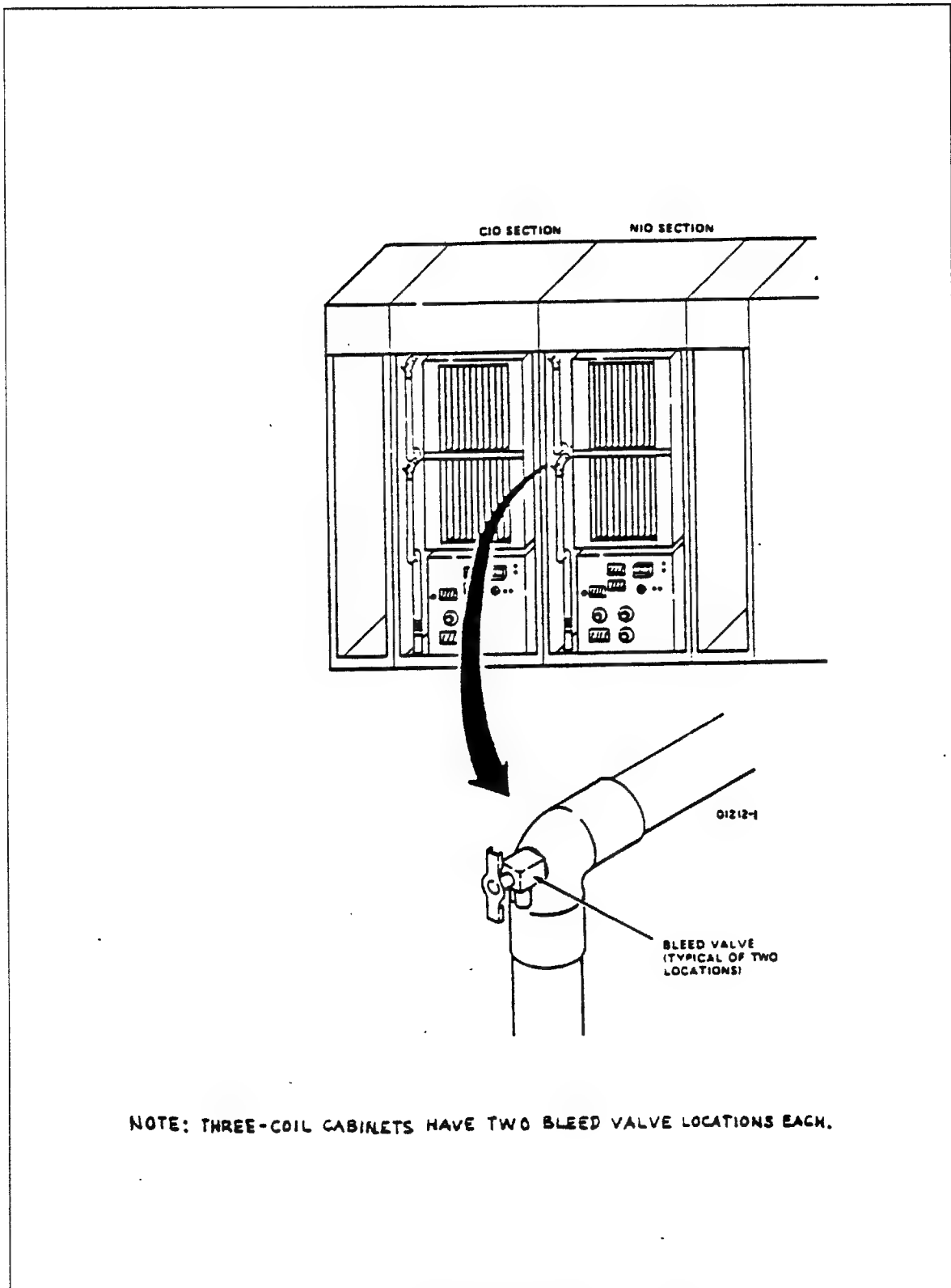


Figure 3-19. IOU Air Bleed Valve Locations

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GH251-A Water Cooling Unit Removal **4**

Drain Site Water From GH251-A WCU	4-2
Disconnect CP-0 Site Supply and Return Water-Hose Assemblies	4-4
Disconnect GH251-A Supply and Return Water-Hose Assemblies	4-6
Prepare Unit for Antifreeze	4-8
Add and Circulate Antifreeze in Unit	4-10
Drain Distilled Water From GH251-A WCU	4-14
Drain, Disconnect, and Remove Hoses and Manifolds	4-18
Remove GH251-A WCU Power Wires	4-20
Disconnect SPM Cable	4-22
Move Unit and Pack for Shipment	4-23

GH251-A Water Cooling Unit Removal

4

This section contains procedures for removing a GH251-A WCU from a system prior to installing a GH251-C, a GH252-A or GH252-C WCU.

Do not remove the supply and return water hoses between the manifolds and the IOU. However, if a CP-1 is to be added, new hoses and manifolds must be added (refer to chapter 3 for details).

Removal procedures include the following:

- Drain Site Water From GH251-A WCU
- Disconnect CP-0 Site Supply and Return Water-Hose Assemblies
- Disconnect GH251-A Supply and Return Water-Hose Assemblies
- Prepare Unit for Antifreeze
- Add and Circulate Antifreeze in Unit
- Drain Distilled Water From GH251-A WCU
- Drain, Disconnect and Remove Hoses and Manifolds
- Remove GH251-A WCU Power Wires
- Disconnect SPM Cable
- Move Unit and Pack for Shipment

Removal tools/parts required:

- Phillips screwdriver
- Slotted screwdriver
- Water tank drain hose
- Water tank drain hose
- 11.4-L (3 gal) empty water container
- Paper tissues or towels
- Rol-a-lifts (two)
- 11.4-L (3 gal) ethylene glycol (antifreeze)
- Adjustable wrench
- Wet-dry vacuum
- Funnel
- Antistatic smock

NOTE

IS THE GH251-A BEING REPLACED?

- *If yes, continue with procedures in this chapter*
 - *If no, go to chapter 5 for GH251-C procedures or go to chapter 6 for GH252-A/GH252-C procedures*
-

Drain Site Water From GH251-A WCU

NOTE

IS CP-1 PRESENT?

- If yes, continue.
 - If no, go to next procedure.
-

Use this procedure to drain site water from the GH251-A WCU. Refer to figure 4-1.

Prerequisites

- 50/60-Hz power is on, water cooling unit is operating

Tools/parts required

- 19.5 L (5 gal) container
- Drain hose kit, P/N 18988208
- Air compressor, optional
- Adjustable wrench
- Towel or tissues

NOTE

50/60-Hz power must be applied to drain the heat exchanger.

Procedure

- 1. Close site supply and return water valves at the source.
- 2. Attach drain hoses (P/N 17608600) to boiler drain valves on supply and return hose assemblies and place ends in container to drain.
- 3. Turn three-way valves to position 2.
- 4. Remove cap from boiler drain valves and open valves by turning fully CCW with adjustable wrench. Water drains from heat exchanger and hoses.

NOTE

Steps 5 and 6 are optional.

- 5. Attach air compressor to drain hose on return hose assembly and force remaining water from heat exchanger and hoses.
- 6. Remove air compressor and drain hoses.
- 7. Close boiler drain valve by turning fully CW with the adjustable wrench.
- 8. Replace cap on boiler drain valve.

NOTE

Leave three-way valves in position 2.

- 9. Set 50/60-Hz INPUT POWER DISCONNECT circuit breaker on WCU to OFF.
- 10. Set 50/60-Hz wall-mounted circuit breaker to OFF.

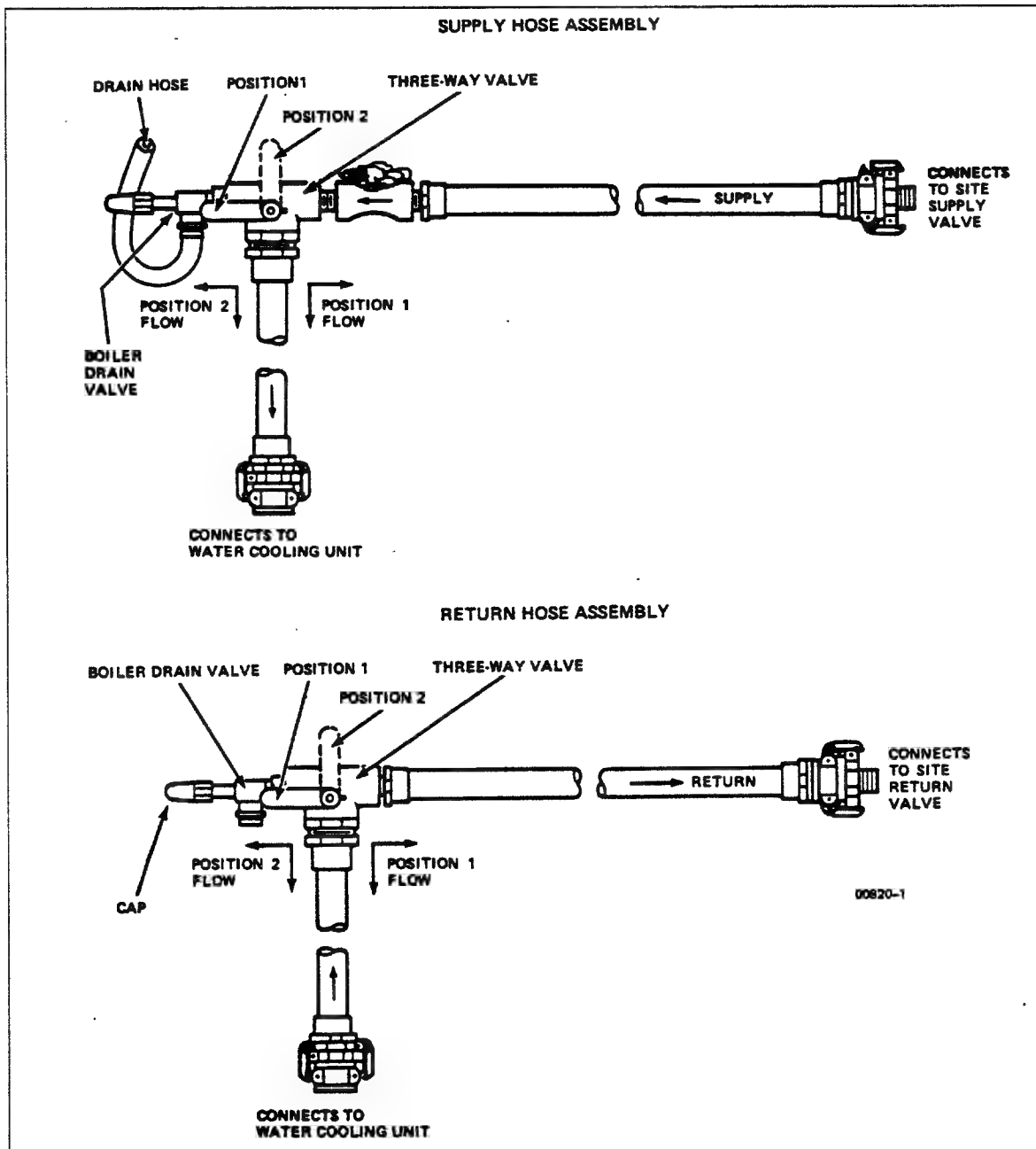


Figure 4-1. Site Water-Hose Assemblies

Disconnect CP-0 Site Supply and Return Water-Hose Assemblies

Use this procedure to disconnect the site supply and return water-hose assemblies from the CP-0 water cooling unit. Refer to figure 4-2.

Prerequisites

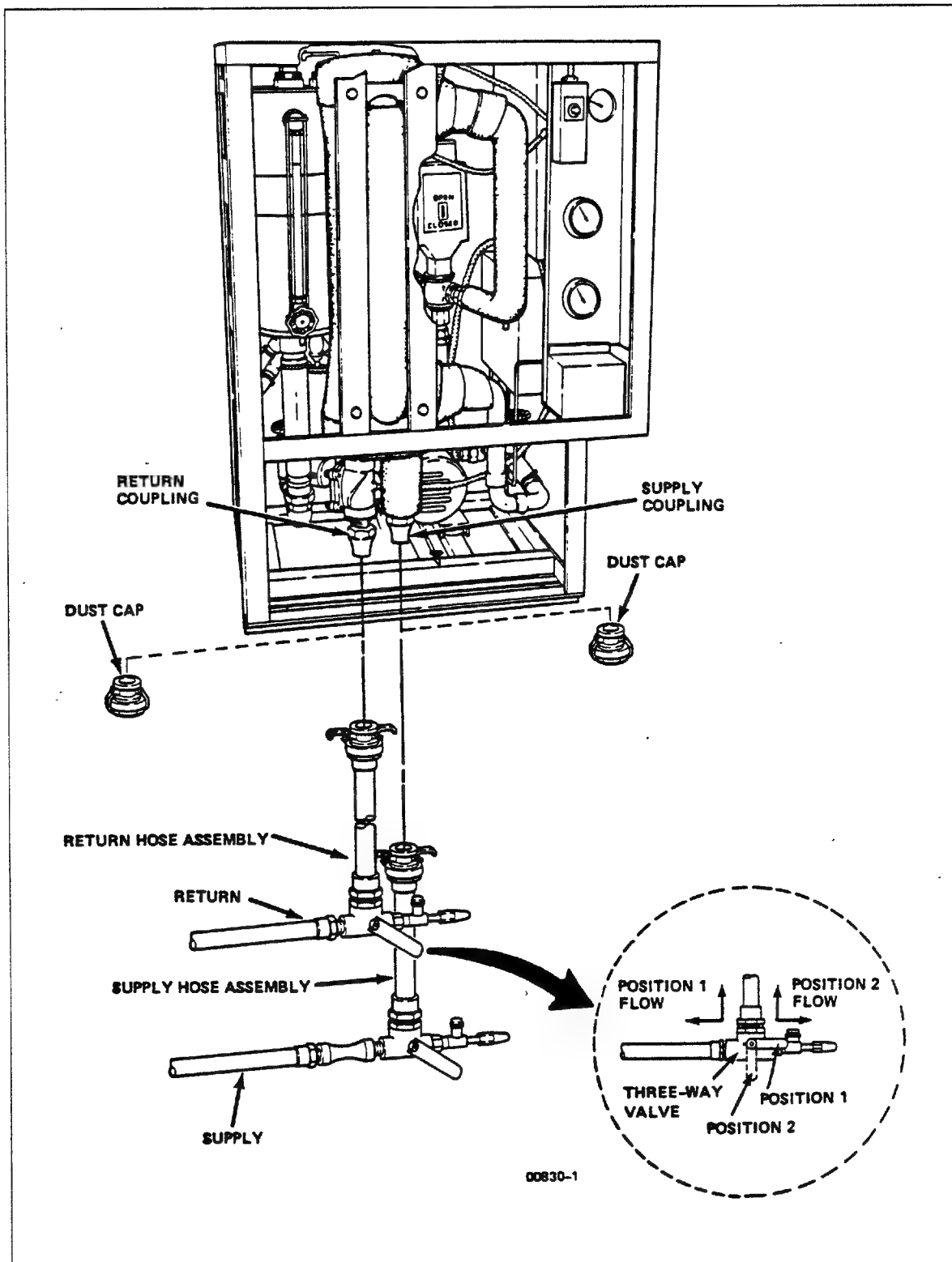
- Site water supply and return valves are closed at source
- Distilled water has been drained from CP-0 water cooling unit

Tools/parts required

- 19 L (5 gal) container

Procedure

- 1. Disconnect site supply hose assembly from supply coupling on water cooling unit.
- 2. Place supply hose assembly into container to drain water.
- 3. Install dust cap on supply coupling on water cooling unit.
- 4. Turn three-way valve on supply hose assembly to position 1. Water drains from supply hose.
- 5. Disconnect site supply hose at the source and drain remaining water from hose into container.
- 6. Pull supply hose assembly from floor, coil, and connect hose ends together.
- 7. Repeat steps 1 through 6 for site return hose assembly.
- 8. Place supply and return hose assemblies in appropriately labeled container for shipment.



Disconnecting
 Figure 4-2. CP-0, WCU and Site Supply/Return Water-Hose Assemblies

Disconnect GH251-A Supply and Return Water-Hose Assemblies

Use this procedure to disconnect the site supply and site return water-hose assemblies from the GH251-A WCU. Refer to figure 4-3.

NOTE

ARE CP-1 AND GH251-A WCU PRESENT?

- If yes, continue.
 - If no, go to next procedure.
-

Prerequisites

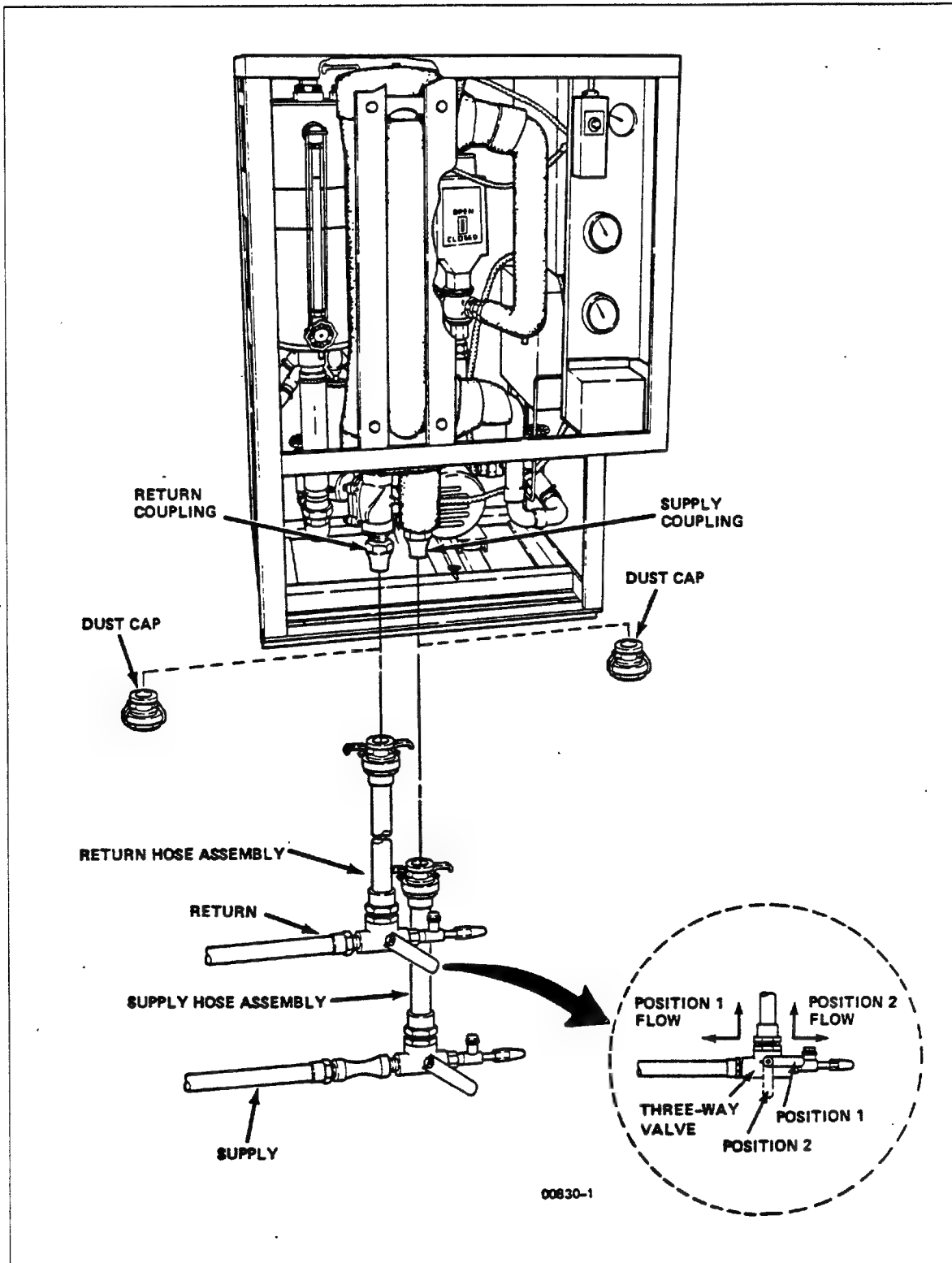
- Site water supply and return valves are closed at source
- Site water has been drained from GH251-A WCU

Tools/parts required

- 19 L (5 gal) container

Procedure

- 1. Remove warning tags from cams located on WCU site supply and return hose quick connects.
- 2. Disconnect site supply hose assembly from supply coupling on water cooling unit.
- 3. Place supply hose assembly into container to drain water.
- 4. Install dust cap on supply coupling on water cooling unit.
- 5. Turn three-way valve on supply hose assembly to position 1. Water drains from supply hose.
- 6. Remove warning tags from cams located on quick connects connected at site supply and return water line source.
- 7. Disconnect site supply hose at the source and drain remaining water from hose into container.
- 8. Pull supply hose assembly from floor, coil, and connect hose ends together.
- 9. Repeat steps 2 through 8 for site return hose assembly.
- 10. Place supply and return hose assemblies in appropriately labeled container for shipment.



Disconnecting GH251-A
 Figure 4-3. CP-0, WCU and Site Supply/Return Water-Hose Assemblies

Prepare Unit for Antifreeze

Use this procedure to drain approximately one-half of the distilled water from the distilled water units in preparation for the addition of antifreeze. Refer to figure 4-4.

Prerequisites

- 50/60- and 400-Hz power to the system is removed
- System contains normal amount of distilled water

Tools/parts required

- 26.6 L (7 gal) container
- Drain hose, P/N 53705652
- Drain hose, P/N 52807870

NOTE

Measure the amount of water drained. For an approximate 50% mixture of water and antifreeze, drain 6 to 7 gallons of water.

Procedure

- 1. Attach drain hose (P/N 53705652) to water tank drain valve in CP-0 and place hose end in container.
- 2. Remove fill plug located at top of water tank.
- 3. Open heat exchanger air vent.
- 4. Open water tank drain valve by turning fully CCW. Allow water to drain from tank into container.
- 5. Close drain valve and remove drain hose.
- 6. Measure the number of gallons drained from the tank.
- 7. Attach drain hose (P/N 52807870) to CP-0 drain valve and place hose end in container.
- 8. Open valve by turning fully CCW. Drain a total of 7 gallons from CP-0 and WCU.
- 9. Close valve and remove hose.
- 10. Repeat steps 1 through 7 for CP-1 and GH251-A, if present.

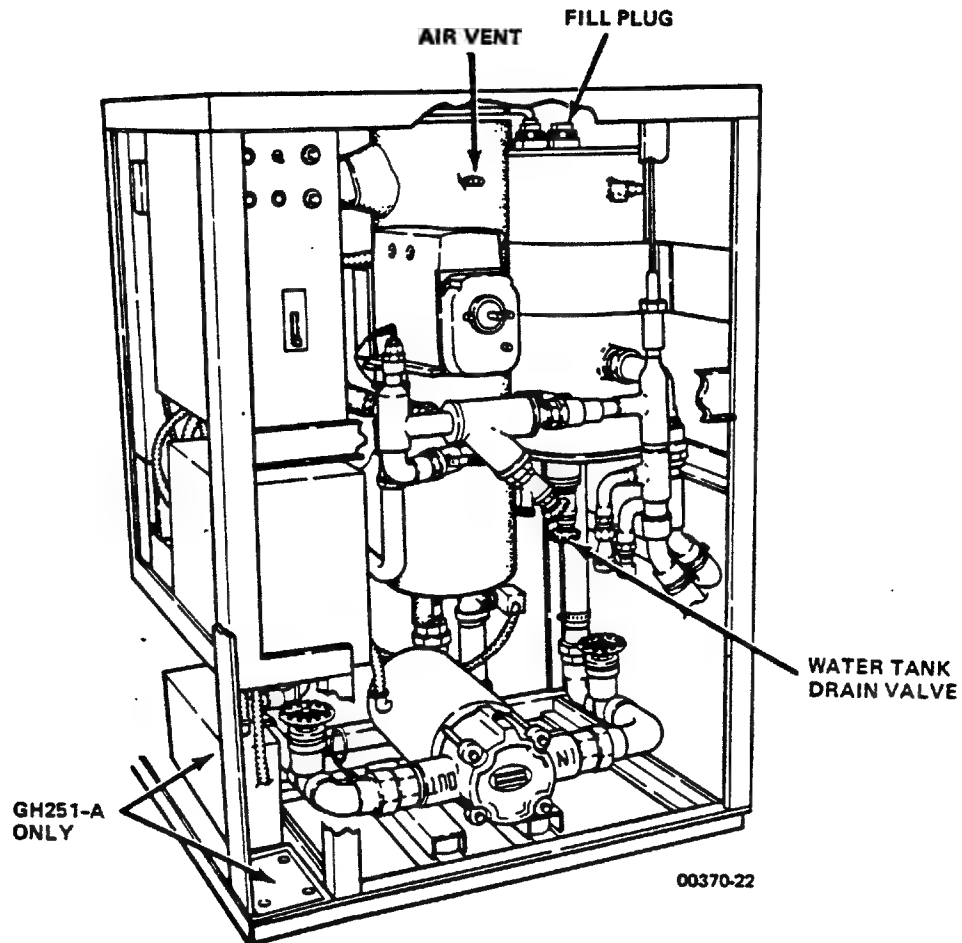


Figure 4-4. GH251-A Water Cooling Unit, Rear View

Add and Circulate Antifreeze in Unit

Use this procedure to add and circulate antifreeze in the WCU to protect against freezing during transportation. Refer to figure 4-5.

NOTE

After the system has been drained and is refilled during a re-installation, any remaining antifreeze will be very diluted and will not affect system operation.

Prerequisites

- Units have been drained of 22.8 L (6 gal) to 26.6 L (7 gal) distilled water.

Tools and materials required

- Absorbant towels or tissues
- 26.6 L (7 gal) ethylene glycol
- Funnel
- Hygrometer
- Pint-sized container

Procedure

- 1. Using funnel, fill CP-0 water tank with antifreeze (about three gallons).
- 2. Close heat exchanger air vent.
- 3. Set 50/60-Hz circuit breaker on wall-mounted power panel to ON.
- 4. Set mode switch on WCU to LOCAL.
- 5. Apply 50/60-Hz power by setting INPUT POWER DISCONNECT circuit breaker at rear of WCU unit to ON. Antifreeze pumps out of tank and into a chassis until LOW LEVEL condition stops pump.
- 6. Add more antifreeze as necessary and switch INPUT POWER DISCONNECT circuit breaker OFF and ON again to reset fault condition. Repeat until all antifreeze has been added.
- 7. Allow pump to run for 10 minutes to circulate and mix water and antifreeze.
- 8. Open heat exchanger air bleed valve until all air is released.
- 9. Close heat exchanger air bleed valve.
- 10. Place container beneath water tank drain valve, open valve, and drain a pint of liquid into container.
- 11. Using hygrometer, check the liquid to determine cooling protection of the mixture. 50% mixture should protect to -40°C (-40°F).

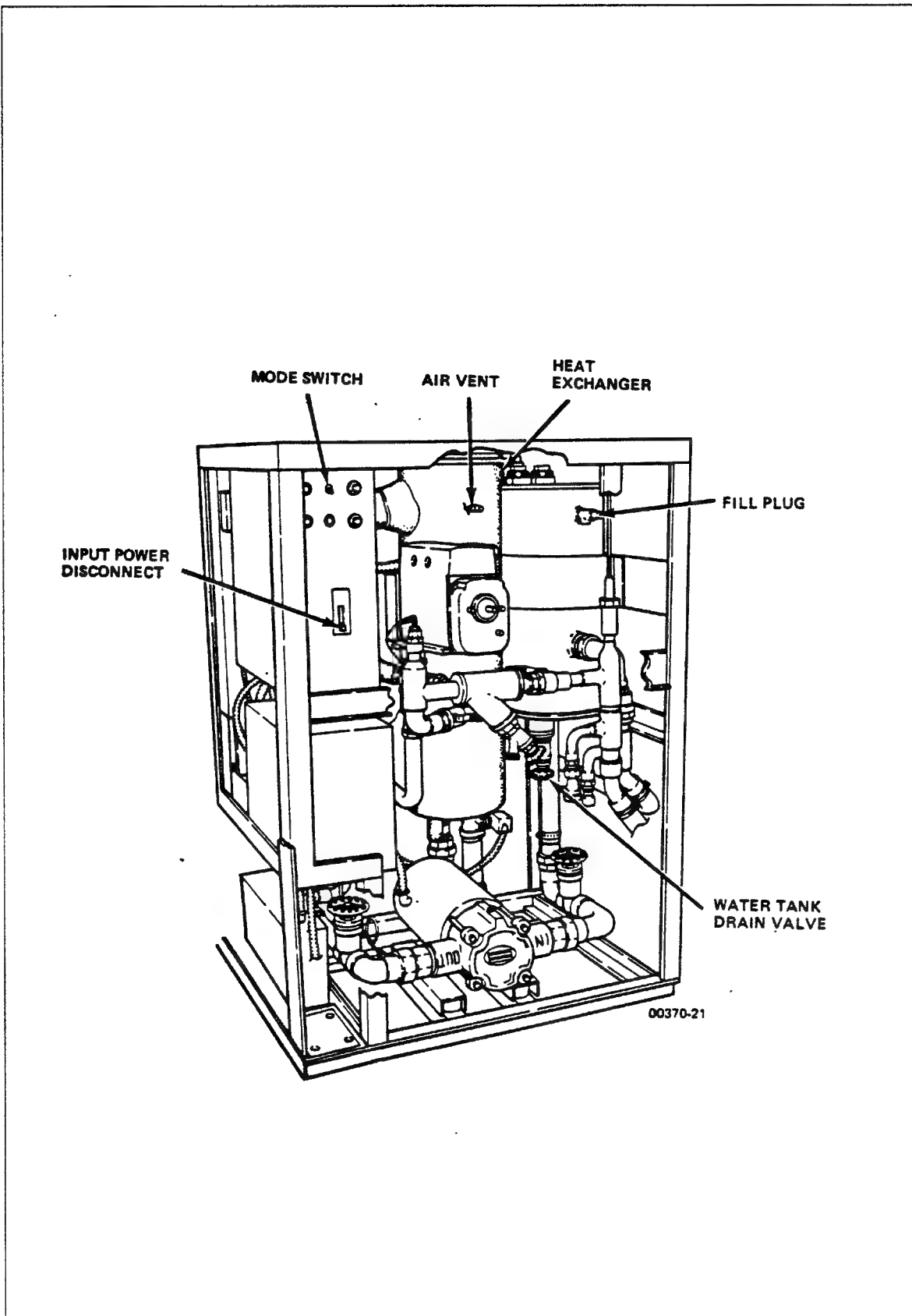


Figure 4-5. GH251-A Water Cooling Unit, Rear View

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- ___ 12. If hygrometer check does not indicate correct mixture, drain part of liquid from water tank and add antifreeze or water, circulate mixture and recheck mixture with hygrometer.
- ___ 13. When mixture in system is approximately 50% and mixture has been circulated, bleed water line to PUMP OUTLET PRESSURE gauge and allow antifreeze to fill tube as follows:
 - ___ a. Slowly loosen connection to rear of gauge until water begins to seep out. Use towel or tissue to absorb leaked water.
 - ___ b. Allow water to drip for 30 seconds.
 - ___ c. Tighten connection.
- ___ 14. Set INPUT POWER DISCONNECT circuit breaker at rear of WCU to OFF.
- ___ 15. Remove 50/60-Hz power to WCU and CP-0 at the wall breaker.
- ___ 16. Repeat this procedure for CP-1 and GH251-A, if present.

CAUTION

Do not allow antifreeze/water mixture to remain in system. Perform the following Drain Distilled Water procedure immediately after completing this procedure.

Drain Distilled Water From GH251-A WCU

Use this procedure to drain the distilled water and antifreeze mixture from the GH251-A water cooling unit. Refer to figures 4-6 and 4-7.

NOTE

IS CP-1 PRESENT?

- *If yes, continue.*
 - *If no, go to next procedure.*
-

Prerequisites

- Power to CP-1 and GH251-A is removed
- Site water has been drained
- Antifreeze has been circulated in distilled water system

Tools/parts required

- Slotted screwdriver
- Absorbant tissues
- Phillips screwdriver
- Adjustable wrench
- Pint-sized container (to drain water)
- Large container (to drain water)
- Drain kit, P/N 18988208
- Air compressor, optional

Procedure

- 1. Disconnect supply and return hoses that connect CP-1 to WCU and place in container to drain.
- 2. Attach drain hose (P/N 53705652) to water tank drain valve and place hose end in container to drain.
- 3. Open heat exchanger air vent.
- 4. Open water tank drain valve fully CCW and allow water to drain.
- 5. Place pint-sized container beneath liquid level sight glass drain valve and open valve.
- 6. Remove insulation from access valve located at lower elbow of heat exchanger.
- 7. Remove end cap from stem of access valve.
- 8. Attach drain hose (P/N 52807870) to access valve and place end of hose in container. Allow water to drain.
- 9. Remove drain hose.

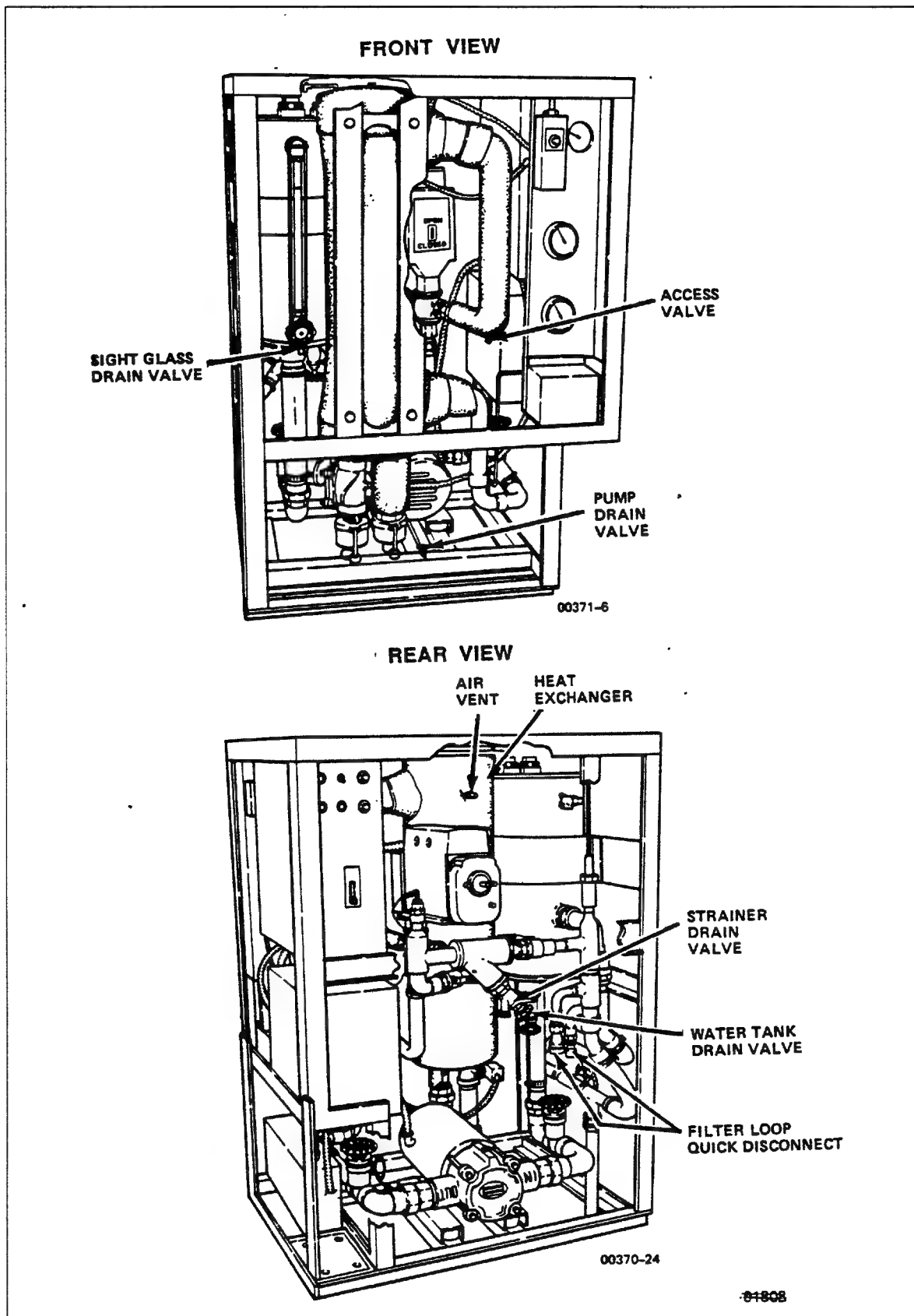


Figure 4-6. GH251-A WCU, Front and Rear Views

- ___ 10. Attach drain hose (P/N 53705652) to strainer drain valve and place hose end in container.
- ___ 11. Open strainer drain valve fully CCW and allow water to drain.
- ___ 12. Remove drain hose.
- ___ 13. Drain filter loop quick-disconnects by pressing the plunger of each disconnect with a small slotted screwdriver.
- ___ 14. Remove floor tile located directly under water pump (if possible).
- ___ 15. Attach drain hose (P/N 52807870) to drain valve located on underside of water pump and place hose end in container.
- ___ 16. Open drain valve fully CW and allow water to drain.
- ___ 17. Close sight glass drain valve and heat exchanger air vent.

NOTE

Steps 18 through 19 are optional.

- ___ 18. Remove water tank fill plug and place air compressor hose in fill hole. Seal gap with absorbant tissues.
- ___ 19. Using air compressor, blow remaining water from WCU. Water drains from pump drain hose into container.
- ___ 20. Remove compressor nozzle from water tank and replace fill plug.
- ___ 21. Remove hose from water pump drain valve and close drain valve.

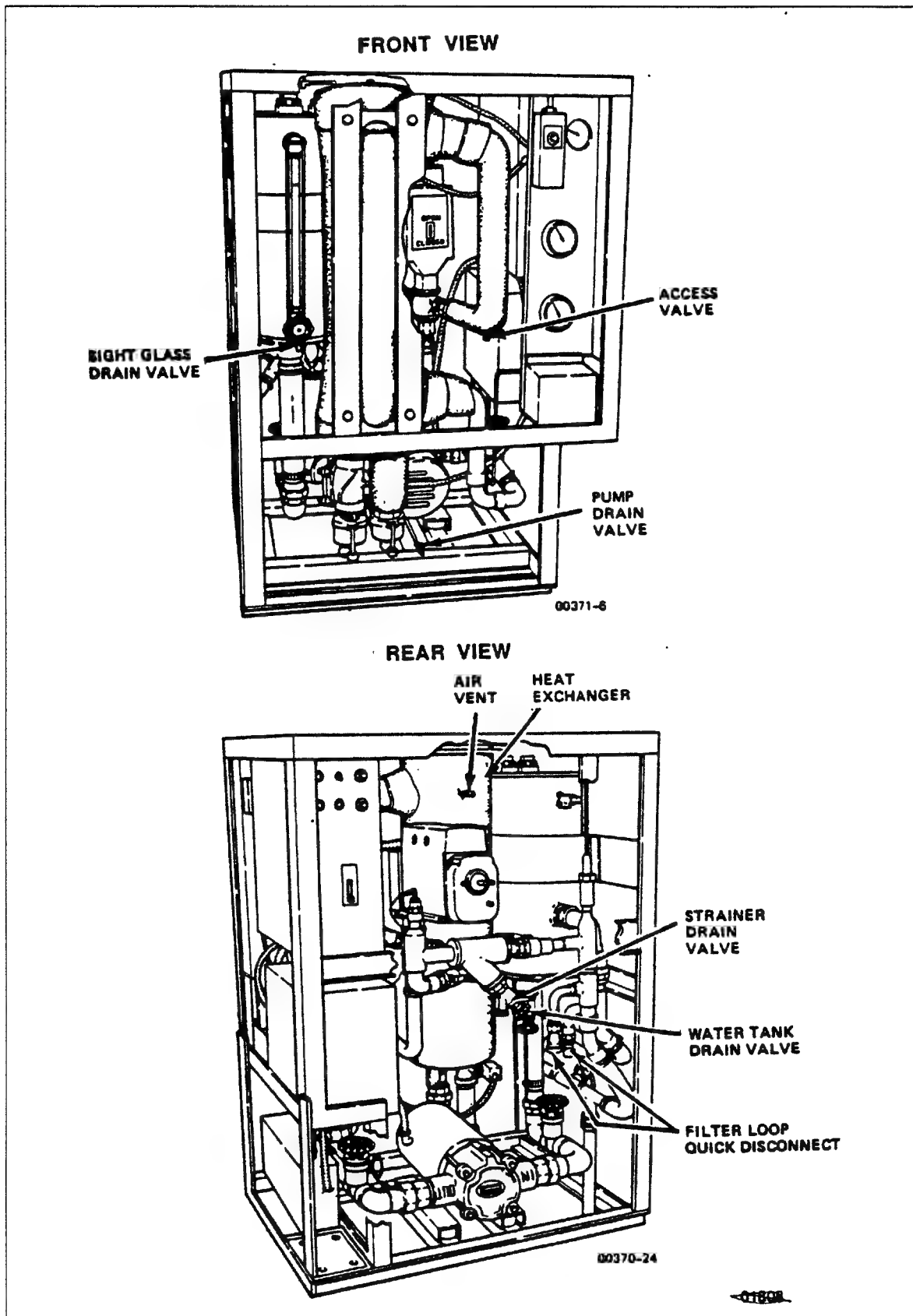


Figure 4-7. GH251-A WCU, Front and Rear Views

Drain, Disconnect, and Remove Hoses and Manifolds

Use this procedure to drain, disconnect, and remove the manifolds and supply and return hoses connected to the GH251-A WCU. Refer to figure 4-8.

NOTE

IS CP-1 PRESENT?

- *If yes, continue.*
 - *If no, go to next procedure.*
-

Prerequisites

- CP-1 supply and return column hoses have been removed
- GH251-A WCU has been drained
- Power is removed from the GH251-A WCU
- WCU supply and return hoses are disconnected from WCU and placed in container to drain

Tools/parts required

- Two 19L (5 gal) containers
- Slotted screwdriver
- Wet/dry vacuum

Procedure

NOTE

A container is required for the next step.

- ___ 1. Lift CP-1 supply hose at manifold end. Water drains through WCU supply hose.
- ___ 2. Disconnect supply hose.
- ___ 3. Lift CP-1 return hoses at manifold end. Water drains through WCU return hose.
- ___ 4. Disconnect return hose.
- ___ 5. Repeat steps 1 through 4 for all CP-1 columns.
- ___ 6. Lift supply manifold to drain water from manifold and WCU supply hose.
- ___ 7. Disconnect WCU supply hose from manifold.
- ___ 8. Lift return manifold to drain water from manifold and WCU return hose.

- ___ 9. Disconnect WCU return hose from return manifold.
- ___ 10. Coil and attach hose ends together and place hoses and manifolds in appropriately labeled box for shipment.

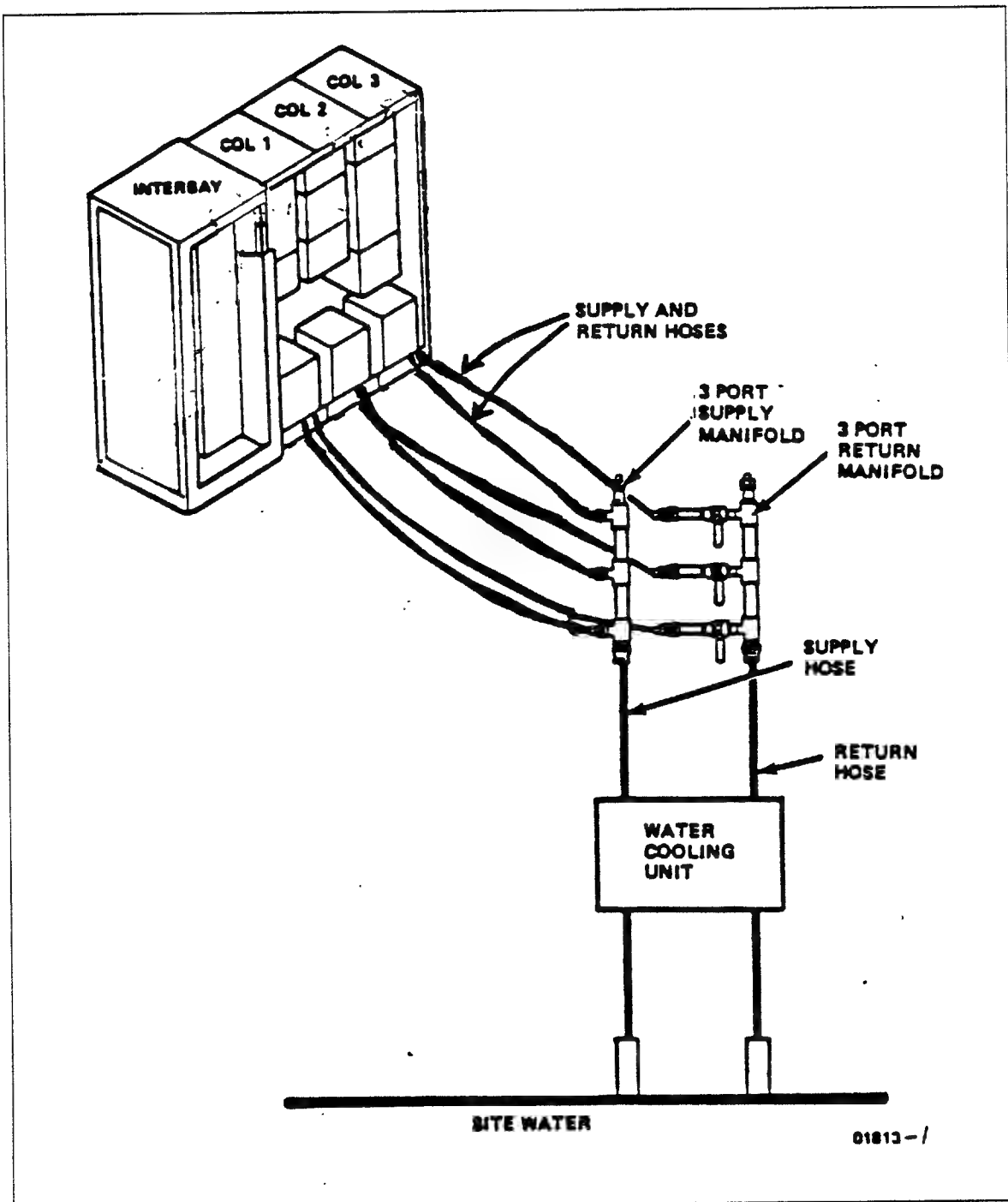


Figure 4-8. Supply and Return Hose Connections

Remove GH251-A WCU Power Wires

Use this procedure to disconnect and remove power wires from the GH251-A water cooling unit. Refer to figure 4-9.

NOTE

IS GH251-A PRESENT?

- *If yes, continue.*
 - *If no, go to next procedure.*
-

Prerequisites

- Wall-mounted 50/60-Hz circuit breaker for WCU is off
- WCU has been drained of site and distilled water

Tools/parts required

- Phillips screwdriver
- Slotted screwdriver
- Multimeter, John Fluke Model 8020A or equivalent

NOTE

Local electrical codes may require that an electrician perform this procedure.

Procedure

- ___ 1. Remove cover from power input box.
- ___ 2. Check terminals using multimeter to ensure that power is removed.
- ___ 3. Remove power and ground wires from terminals in the power input box.
- ___ 4. Unscrew cable fastener at bottom of power input box and push wires down through bottom of cabinet to floor.
- ___ 5. Replace cover on power input box.
- ___ 6. Remove floor tiles as necessary to access power connector beneath floor.
- ___ 7. Disconnect ends of power connector.
- ___ 8. Disconnect male end of connector from power cable.
- ___ 9. Reconnect ends of power connector and place assembly in GH251-A cabinet for shipment.

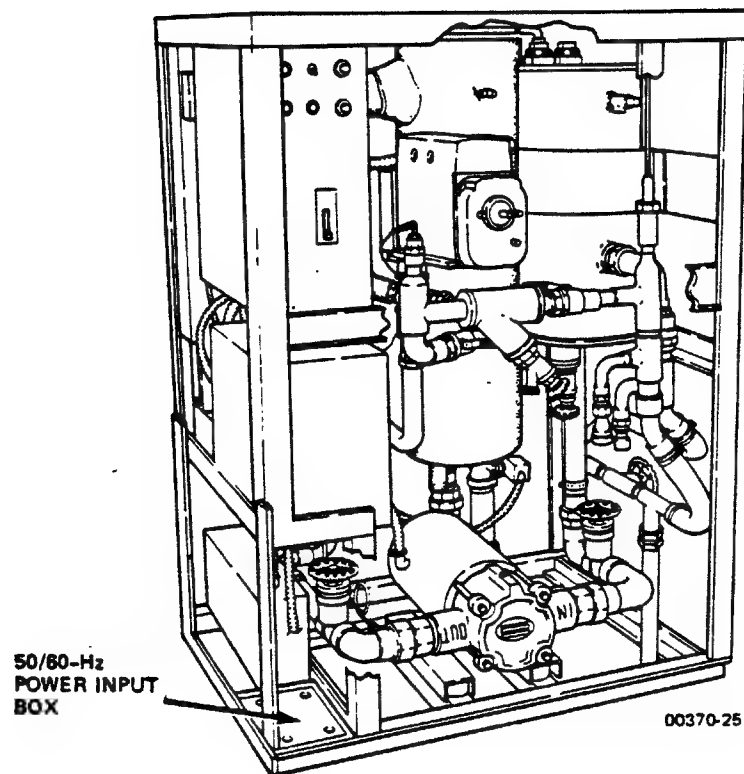


Figure 4-9. GH251-A WCU Power Input Box

Disconnect SPM Cable

Use this procedure to disconnect the SPM cable from the WCU. Refer to Figure 4-10.

Procedure

- 1. Remove cover from interface assembly.
- 2. Disconnect cable from J1 inside interface assembly. (Use the equivalent of a jeweler's screwdriver to loosen the two screws that secure J1 to its mating connector.)
- 3. Push cable down through cable floor cutout.
- 4. Install interface assembly cover.

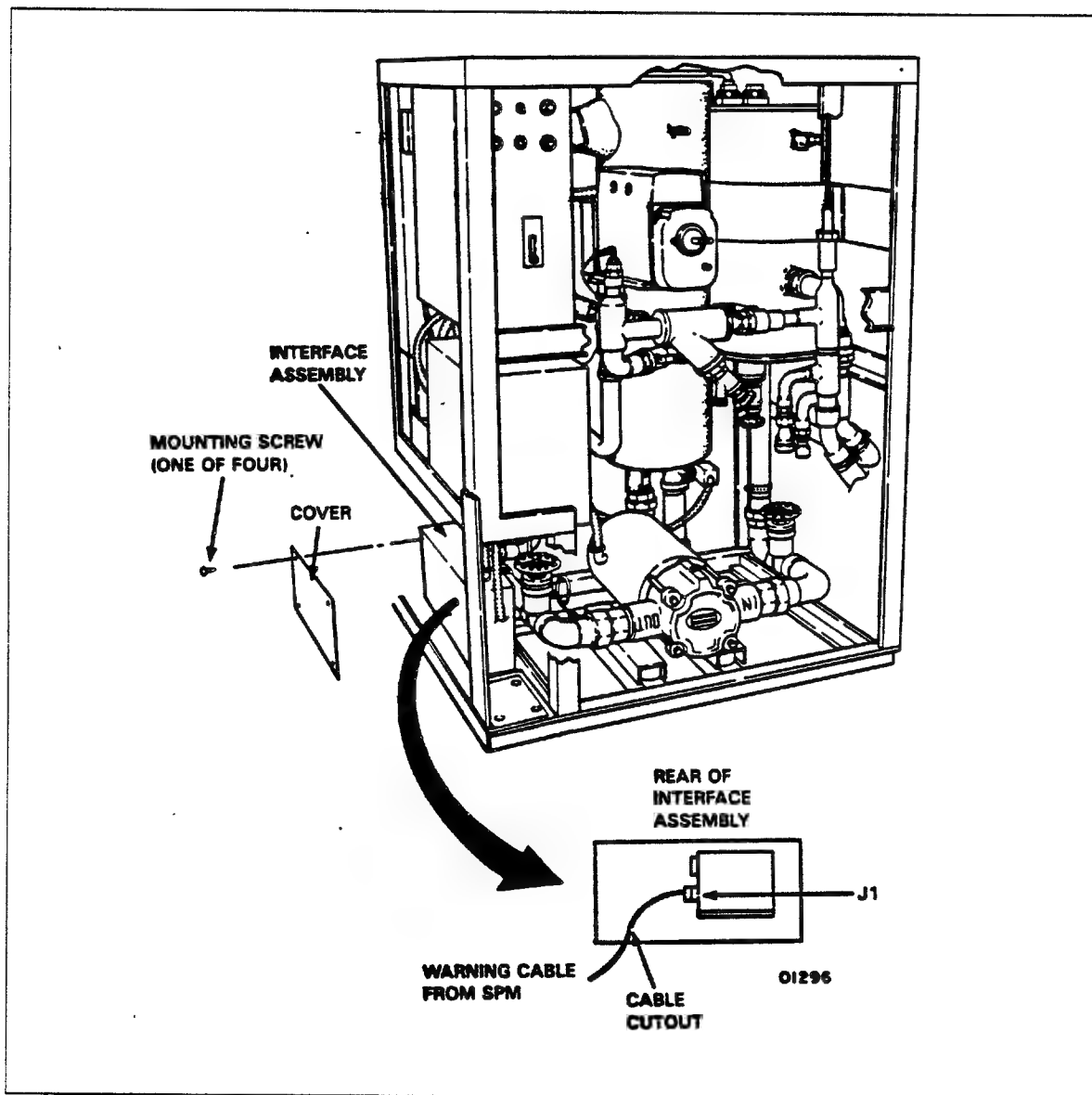


Figure 4-10. SPM Cable Connections to GH251-A Water Cooling Unit

Move Unit and Pack for Shipment

Use this procedure to move the WCU away from the system area and prepare the unit for shipment back to the factory.

Procedure prerequisites

- Power and water hoses have been removed
- Unit has been flushed with antifreeze and drained

Tools/parts required

- Two Rol-a-lifts

Procedure

- ___ 1. Install all floor tiles if not already done.
- ___ 2. Move unit away from system area using two Rol-a-lifts.
- ___ 3. Pack unit for shipment according to directions received with packing materials.

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GH251-C Water Cooling Unit Installation 5

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GH251-C Water Cooling Unit Installation 5

This section contains procedures for installing and preparing a GH251-C WCU for use. Major topics covered are as follows:

- **Preinstallation Procedures**
 - Install Site Water Hose Fittings
 - Install AT478-A/AT481-A IOU Distilled Water Hoses
 - Install AT478-A/AT481-A IOU Distilled Water Hoses with Existing CP-1
 - Install AT478-A/AT481-A IOU and AD113-A CP-1 Distilled Water Hoses on 855 Systems
 - Install AT478-A/AT481-A IOU and AD113-A Distilled Water Hoses on 860 Systems
 - Install AD113-A CP-1 Distilled Water Hoses
- **Install GH251-C Water Cooling Unit**
 - GH251-C WCU Placement and Removal of Shipping Bars
 - Connect Water Hoses
 - Connect Water Hose Assemblies to Water Cooling Unit
 - Connect Water Cooling Unit to Water Manifolds
 - Verify or Change Transformer Connections in GH251-C WCU
 - Connect Power to Water Cooling Unit
- **Prepare Water Cooling Unit**
 - Check valves on GH251-C WCU, CP, CM, and IOU
 - Check Pump Rotation on GH251-C WCU
 - Fill Water Tank in GH251-C WCU
 - Bleed Air From GH251-C WCU
 - Adjust Water Flow Rates to CP, CM, and IOU
 - Check GH251-C WCU Temperature, Pressure and Flow
 - GH251-C WCU Low Pressure Switch Adjustment
 - GH251-C WCU High Pressure Switch Adjustment
- **Final Procedures**
 - Check Site Water Flow Rate
 - Bleed Air From CP
 - Bleed Air from IOU
 - Recheck Water Flow Rates
 - Connect SPM Cables

To present the information in this chapter in a structured format, this page has been left blank.

Preinstallation Procedures

Use these procedures to connect site supply and return water hose assemblies to the site supply and return water valves and to place the unconnected hose assembly ends near the floor cutouts for the WCU and the new optional equipment.

Preinstallation procedures (as applicable) include the following:

- Install Site Water Hose Fittings
- Install AT478-A/AT481-A IOU Distilled Water Hoses
- Install AT478-A/AT481-A IOU Distilled Water Hoses with Existing CP-1
- Install AT478-A/AT481-A IOU and AD113-A CP-1 Distilled Water Hoses on 855 Systems
- Install AT478-A/AT481-A IOU and AD113-A CP-1 Distilled Water Hoses on 860 Systems
- Install AD113-A CP-1 Distilled Water Hoses

NOTE

If your upgrade includes a GH251-C WCU continue with these procedures. If your upgrade includes a GH252-A or GH252-C, go to chapter 6 (GH252-A/-C WCU Installation).

Procedure prerequisites

- Site water supply and water return lines have been flushed free of excessive air bubbles, dirty water and debris.

Tools/parts required

- Diagonal cutter or knife
- Masking tape
- Cable tie identifiers
- Antistatic wrist strap(s)
- For IOU (NIO and CIO):
 - One 3-port water supply manifold
 - One 3-port water return manifold
 - Six 3.2m (10 ft) 0.75-inch diameter water hoses (4 for NIO/CIO, 2 for BS213-A CM, if installed)
- For CP-1:
 - One 3-port water supply manifold
 - One 3-port water return manifold
 - Six 3.2 m (10 ft) 0.75-inch diameter water hoses
- For GH251-C WCU:
 - Two 3.2 m (10 ft) 2-inch diameter water hoses
 - Two 9.1 m (30 ft) 1-inch diameter water hoses

Install Site Water Hose Fittings

Use this procedure to install plumbing hardware on site supply and return water hose assemblies. Refer to figure 5-1.

NOTE

Perform this procedure only if site supply and return hoses are not installed or if additional WCU is being installed.

Procedure prerequisites

- Site supply and return water lines have been flushed to prevent dirty water and plumbing debris from flowing through water cooling unit heat exchanger.

Tools/parts required

- Two quick couplings (P/N 67033026).
- Two close nipples (P/N 17627211).
- Two 24-in pipe wrenches with 3-in jaws (P/N 67184782).
- Teflon tape.

Procedure

- 1. Locate two quick couplings.
- 2. Remove warning tags from cams of quick couplings and save them for later replacement.
- 3. Locate two close nipples.
- 4. Wrap two turns of Teflon tape around threads of close nipples in the same direction as travel of threads.
- 5. Screw either end of close nipples into quick couplings.
- 6. Screw unconnected ends of close nipples into site supply and return water valves. Tighten connections using two 24-in pipe wrenches with 3-in jaws. Use one wrench to turn quick disconnect while holding site valve with second wrench.
- 7. Locate the SUPPLY and RETURN water hose assemblies and connect as follows:
 - a. Connect bronze coupling on supply water hose assembly to quick disconnect on site supply water valve. Close both sets of cams on quick disconnect.
 - b. Insert warning tag wire through holes in both cams of quick disconnect and twist tightly.
 - c. Connect bronze coupling on RETURN water hose assembly to quick disconnect on site return water valve. Close both sets of cams on quick disconnect.
 - d. Secure cams on quick disconnect by inserting warning tag wire through holes in both cams and twisting wire ends together tightly.

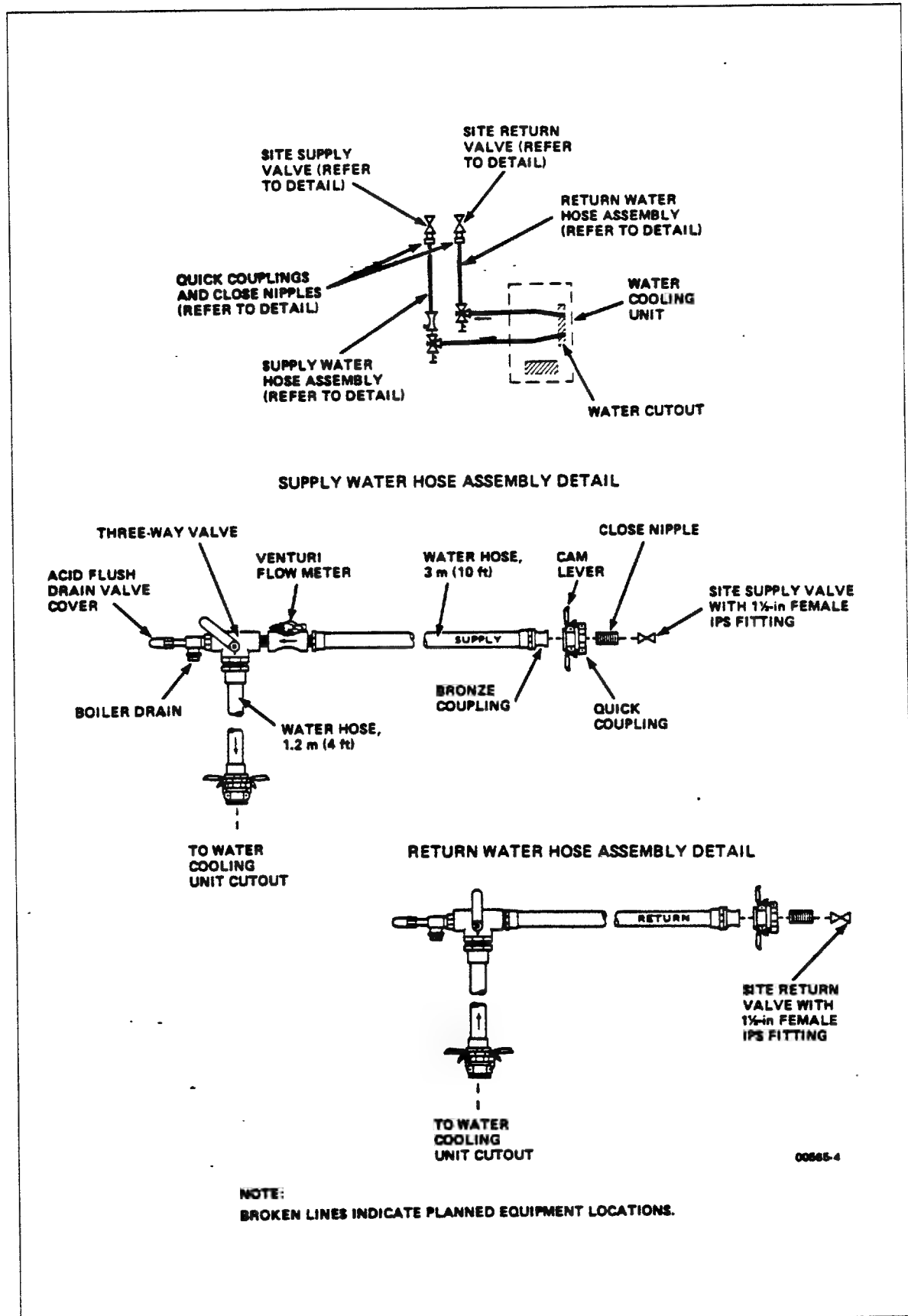


Figure 5-1. WCU Site Supply and Return Hose Assemblies

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- 8. Label opposite ends of water hose assemblies SUPPLY and RETURN (if not already labeled).
- 9. Route water hose assemblies to WCU cutouts.

Install AT478-A/AT481-A IOU Distilled Water Hoses

Use this procedure to install the hoses and manifolds used with the IOU and WCU cabinets. Refer to figure 5-2.

NOTE

ARE SITE SUPPLY AND RETURN HOSES IN PLACE FROM PREVIOUS WCU?

- *If yes, continue*
 - *If no, perform the Install Site Water Hoses procedure, given previously in this chapter, then continue with procedure.*
-

NOTE

IS CP-1 PRESENT?

- *If yes, go to next procedure*
 - *If no, continue*
-

Procedure prerequisites

- Install Site Water Hose Fittings procedure is complete
- Installation of GH251-C WCU is required.

Tools/parts required

- Two 3-port manifolds
- Four 3 m (10 ft) 0.75-inch diameter water hoses

Procedure

- ___ 1. Remove floor tiles, as necessary, to route hoses to locations of NIO, CIO, and WCU cutouts.
- ___ 2. Place 3-port supply and return manifolds used with IOU cabinets in position under raised floor.
- ___ 3. Place four 3 m (10 ft) 0.75-inch diameter supply and return hoses under raised floor between IOU cabinets and supply and return manifolds.
- ___ 4. Connect one end of supply and return hoses to ports on supply and return manifolds.
- ___ 5. Place two 9.1 m (30 ft) supply and return water hoses between WCU and supply and return manifolds.
- ___ 6. Connect one end of each 9.1 m 30 ft hose to end ports of supply and return manifolds.
- ___ 7. Go to Install GH251-C Water Cooling Unit.

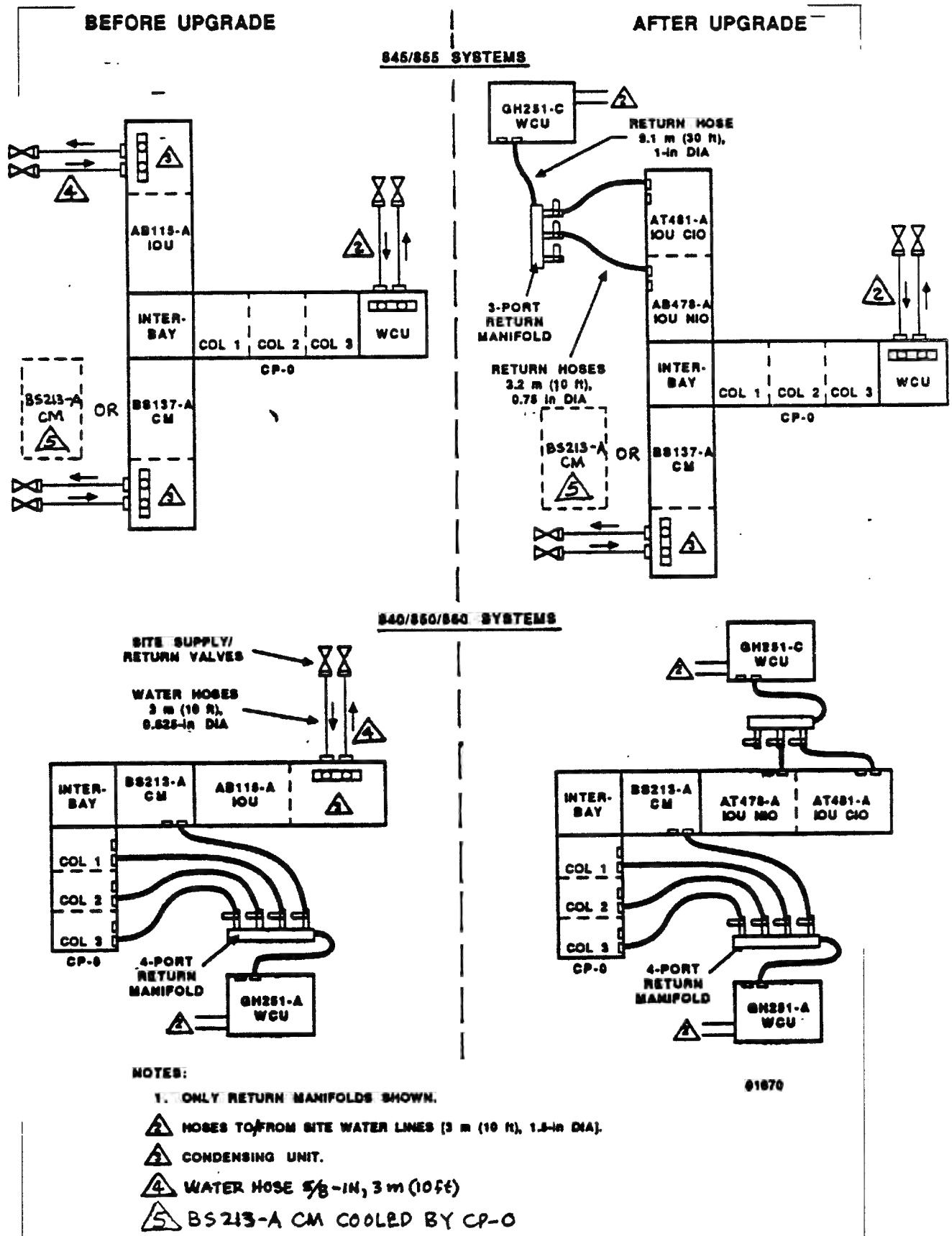


Figure 5-2. Install IOU with WCU - Typical Configuration

Install AT478-A/AT481-A IOU Distilled Water Hoses With Existing CP-1

Use this procedure to install the hoses and manifolds when adding an NIO and a CIO and a WCU to a system that already has CP-1 installed. Refer to figure 5-3.

Procedure prerequisites

- AB115-A IOU has been removed
- CP-1 GH251-A WCU is replaced by GH251-C but hoses and manifolds have been left in place

Tools/parts required

- One set 3-port supply and return manifolds
- Four 3 m (10 ft) 0.75-inch diameter water hoses
- Two 9.1 m (30 ft) 1-inch diameter water hoses

Procedure

- 1. Remove floor tiles, to route hoses to locations of IOU NIO and CIO cabinets.
- 2. Place 3-port supply and return manifolds used with IOU cabinets in position under raised floor.
- 3. Place four 3 m (10 ft) 0.75-inch diameter water hoses under raised floor between IOU NIO and CIO cabinets and supply and return manifolds.
- 4. Connect one end of supply and return hoses to ports on supply and return manifolds.
- 5. Route opposite ends of hoses to approximate locations of IOU NIO and CIO cabinets.
- 6. Connect 9.1 m (30 ft) hoses from 3-port supply and return manifolds to in-line ports of 3-port supply and return manifolds.
- 7. Go to AT478-A and AT481-A IOU Installation (chapter 2).

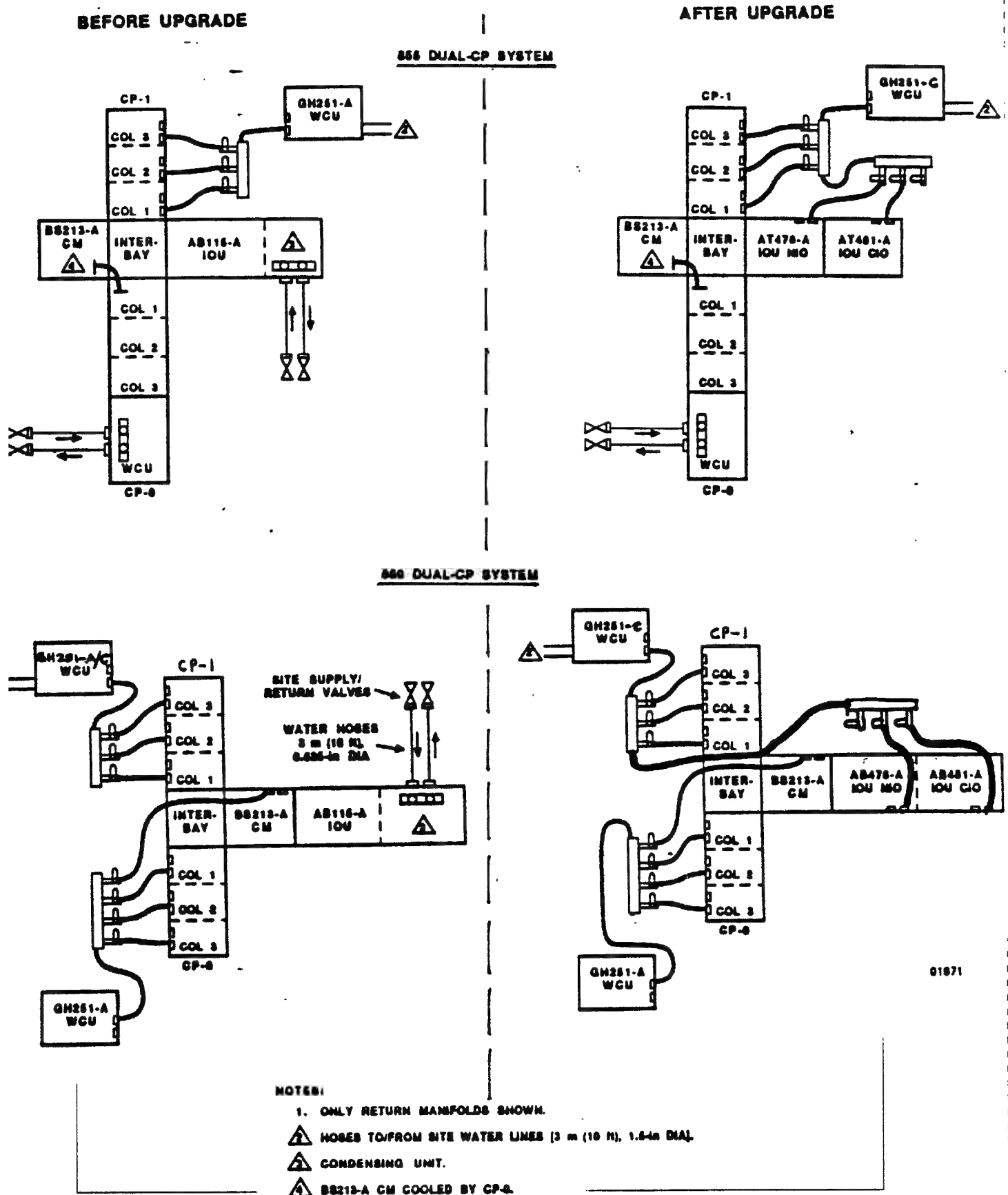


Figure 5-3. Install IOU and WCU with Existing CP-1 - Typical Configuration

Install AT478-A/AT481-A IOU and AD113-A CP-1 Distilled Water Hoses on 855 Systems

Use this procedure to install hoses and manifolds used with the IOU, CP-1 and WCU cabinets. Refer to figure 5-4.

Procedure prerequisites

- AB115-A IOU has been removed
- BS213-A CM must be present
- Installation of GH251-C WCU is required

Tools/parts required

- One set 3-port supply and return manifolds
- Ten 3 m (10 ft) 0.75-inch diameter water hoses
- Two 9.1 m (30 ft) 1-inch diameter water hoses
- Two 3 m (10 ft) 2-inch diameter water hoses

Procedure

- 1. Remove floor tiles to route hoses to locations of IOU NIO and CIO, CP-1 and WCU cabinets.
- 2. Place two 3-port supply and return manifolds used with IOU and CP-1 cabinets in position under raised floor.
- 3. Place ten 3 m (10 ft) 0.75-inch diameter water hoses under raised floor between IOU and CP-1 cabinets and supply and return manifolds.
- 4. Connect one end of supply and return hoses to ports on supply and return manifolds (three on CP-1 manifolds, two on IOU manifolds).
- 5. Label opposite ends of water hoses supply and return for identification later.
- 6. Route unconnected hose ends under floor to approximate locations of new cabinets.
- 7. Route 3 m (10 ft) 2-inch diameter hoses between the in-line ports of two sets of supply and return manifolds.
- 8. Connect 9.1 m (30 ft) 1-inch diameter hoses to in-line ports of supply and return manifolds for CP-1 and place opposite hose ends near WCU cutout.
- 9. Go to Install GH251-C Water Cooling Unit (this chapter), go to AT478-A/AT481-A IOU Installation (chapter 2) and to AD113-A CP-1 Installation (chapter 3).

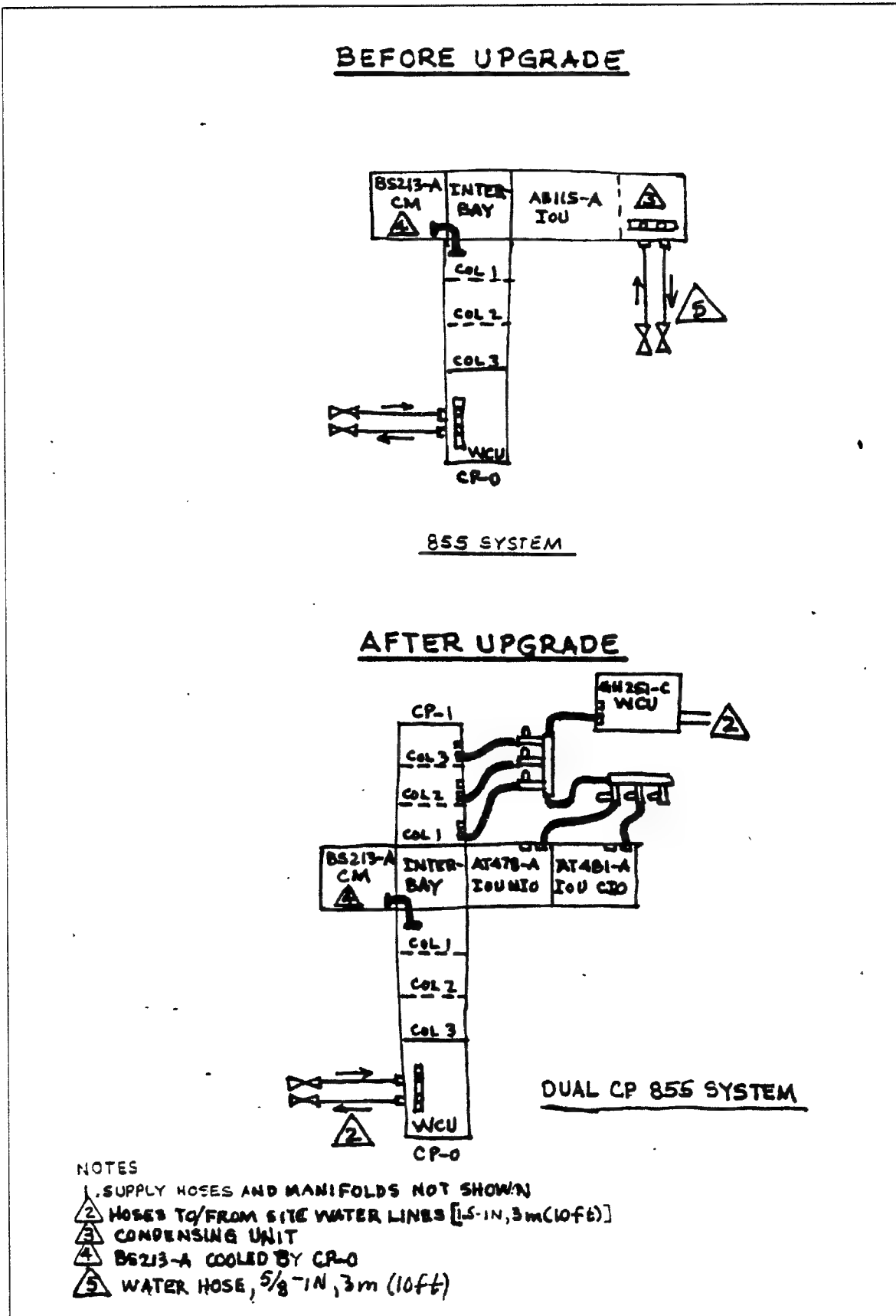


Figure 5-4. Install IOU, CP-1 and WCU Simultaneously - Typical Configuration

Install AT478-A/AT481-A IOU and AD113-A CP-1 Distilled Water Hoses on 860 Systems

Use this procedure to install the hoses and manifolds used with the IOU, CP-1 and WCU cabinets. Refer to figure 5-5.

Procedure prerequisites

- AB115-A IOU has been removed
- Installation of GH251-C WCU is required

Tools/parts required

- Ten 3 m (10 ft) 0.75-inch diameter supply and return water hoses
- Two 9.1 m (30 ft) 1-inch diameter water hoses
- Two 3 m (10 ft) 2-inch diameter water hoses
- Two sets of 3-port manifolds (supply and return)

Procedure

- 1. Remove floor tiles, as necessary, to route hoses to location of IOU NIO, CIO, CP-1, and WCU cabinets.
- 2. Place two 3-port supply and return manifolds used with IOU and CP-1 cabinets in position under raised floor.
- 3. Place ten 3 m (10 ft) 0.75-inch diameter water hoses under raised floor between IOU and CP-1 cabinets and supply and return manifolds.
- 4. Route two 3 m (10 ft) 2-inch diameter hoses between two sets of supply and return manifolds.
- 5. Connect two 3 m (10 ft) 2-inch diameter hoses between in-line ports of supply and return manifolds for CP-1 and IOU cabinets.
- 6. Route two 9.1 m (30 ft) 1-inch diameter hoses between supply and return manifolds for CP-1 and WCU.
- 7. Connect 9.1 m (30 ft) 1-inch diameter hoses to in-line ports of CP-1 manifolds and place opposite hose ends near WCU cutout.
- 8. Go to Install GH251-C Water Cooling Unit (this chapter), go to AT478-A and AT481-A IOU Installation (chapter 2) and to AD113-A CP-1 Installation (chapter 3).

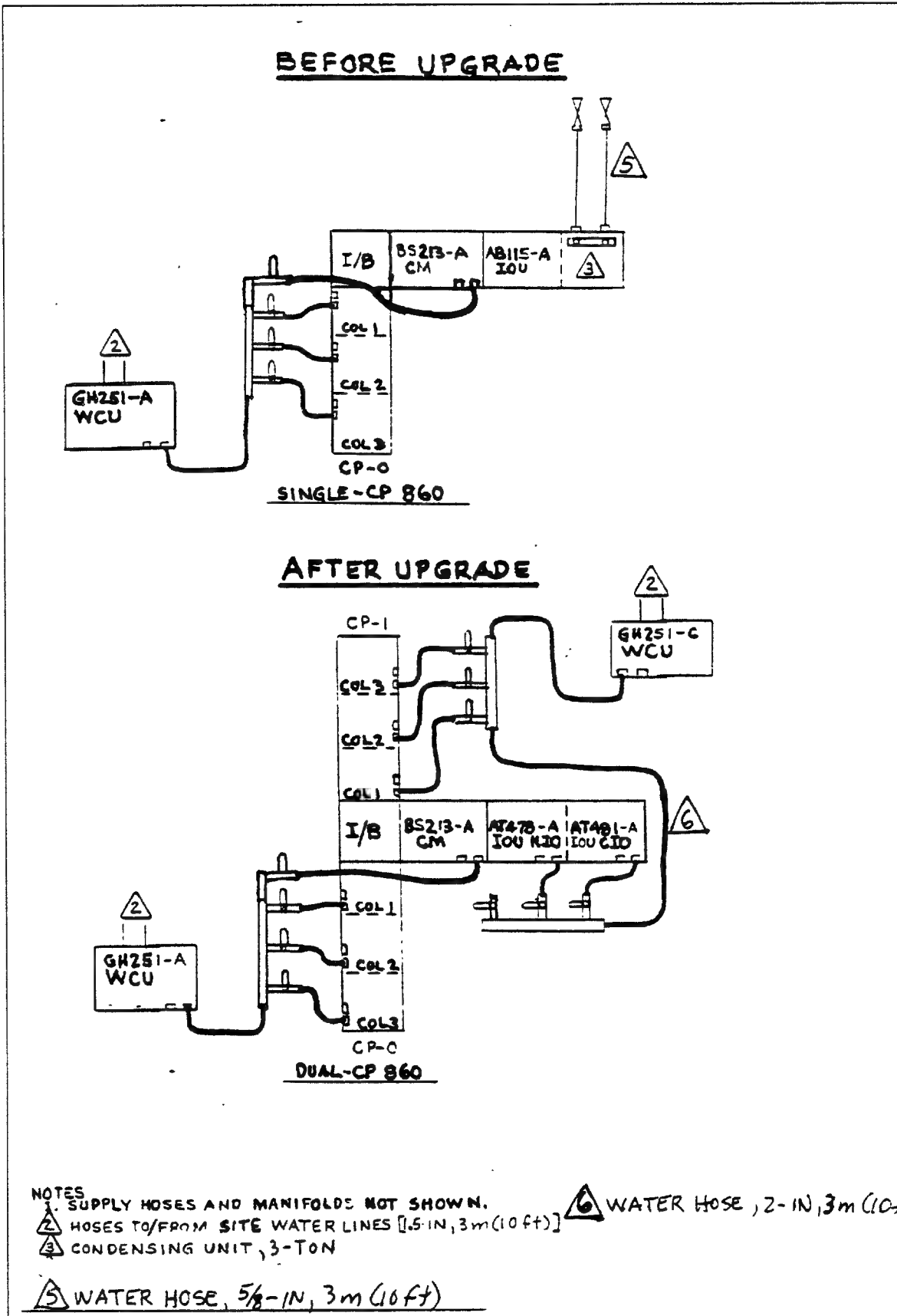


Figure 5-5. Install IOU, CP-1 and WCU Simultaneously - Typical Configuration

Install AD113-A CP-1 Distilled Water Hoses

Use this procedure to install hoses and manifolds used with CP-1 and WCU cabinets. Refer to figures 5-6 and 5-7.

NOTE

A BS213-A CM must be installed on an 855 system before adding a second CP. Refer to the 845/855 Upgrade Options Installation and Checkout manual listed under Related Manuals at the beginning of this manual for installation procedures.

Procedure prerequisites

- BS213-A CM must be installed on an 855 system
- Installation of GH251-C WCU is required

Tools/parts required

- One set 3-port manifolds (supply and return)
- Two 9.1 m (30 ft) 1-inch diameter water hoses
- Six 3 m (10 ft) 0.75-inch diameter water hoses

Procedure

- 1. Remove floor tiles to route hoses to location of CP-1 cabinet.
- 2. Place one 3-port supply and one 3-port return manifold in position under raised floor near CP-1.
- 3. Place six 3 m (10 ft) 0.75-inch diameter water hoses under raised floor between CP-1 cabinet and supply and return manifolds.
- 4. Connect one end of supply and return hoses to ports on supply and return manifolds.
- 5. Label opposite ends of water hoses for later identification.
- 6. Route unconnected hose ends under floor to approximate locations of CP-1 cabinets.

NOTE

WHICH IOU DOES SYSTEM USE?

- *If AB115-A, do steps 7, 8, and 9*
 - *If AT478-A/AT481-A go to step 10*
-

- 7. Route 9.1 m (30 ft) hoses between supply and return manifolds and WCU.
- 8. Connect 9.1 m (30 ft) hoses to in-line ports of manifolds and place opposite hose ends near WCU cabinet.

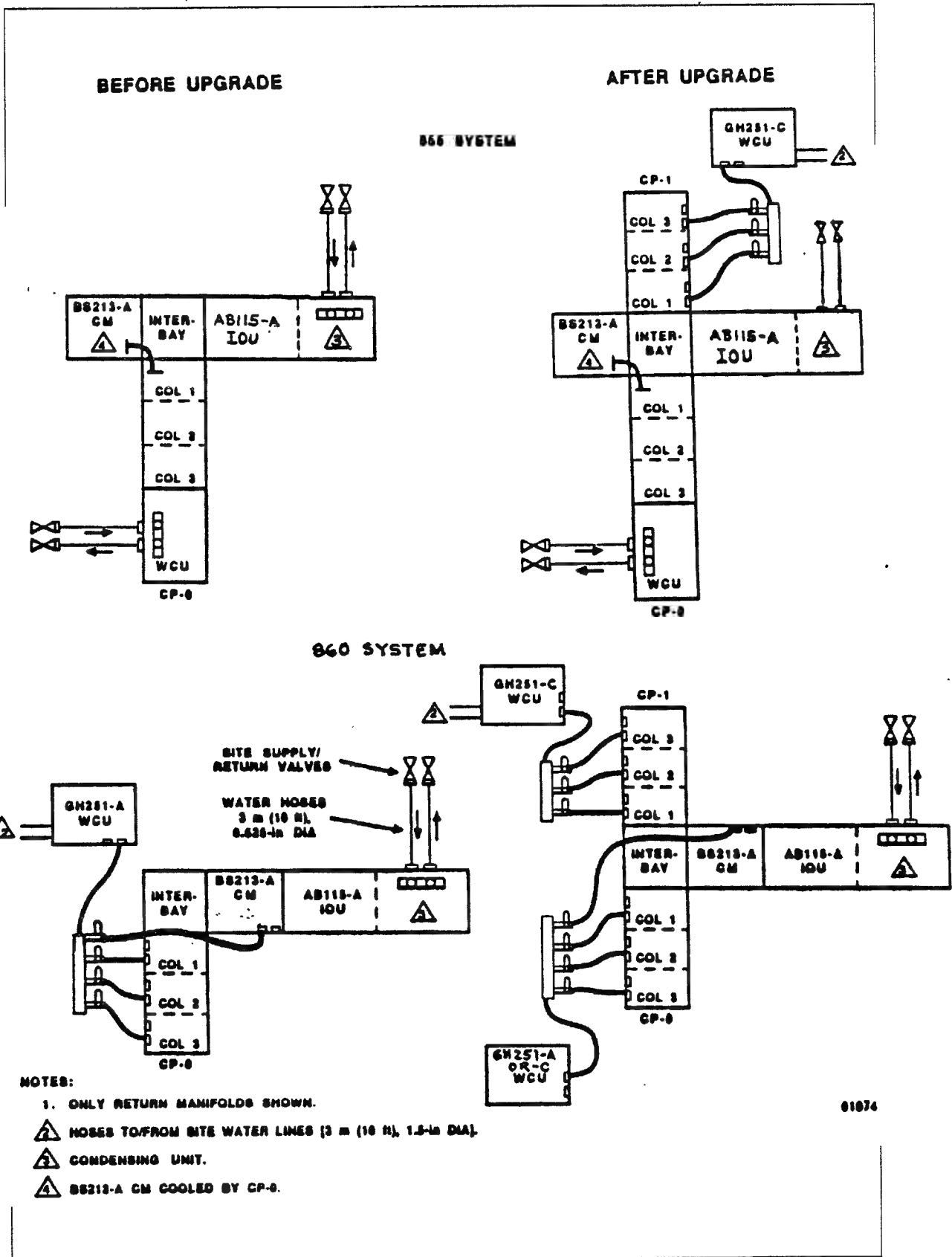


Figure 5-6. Install CP-1 and WCU Only With Existing AB115-A IOU - Typical Configuration

- 9. Go to Install GH251-C Water Cooling Unit (this chapter), and to AD113-A CP-1 Installation (chapter 3).
- 10. Route 9.1 m (30 ft) hoses between supply and return manifolds and WCU. Refer to figure 5-6.1.
- 11. Connect 9.1 m (30 ft) hoses between 2-in cam coupler ports of manifolds serving IOU cabinets and CP-1 columns.
- 12. Go to AD113-A CP-1 Installation (chapter 3).

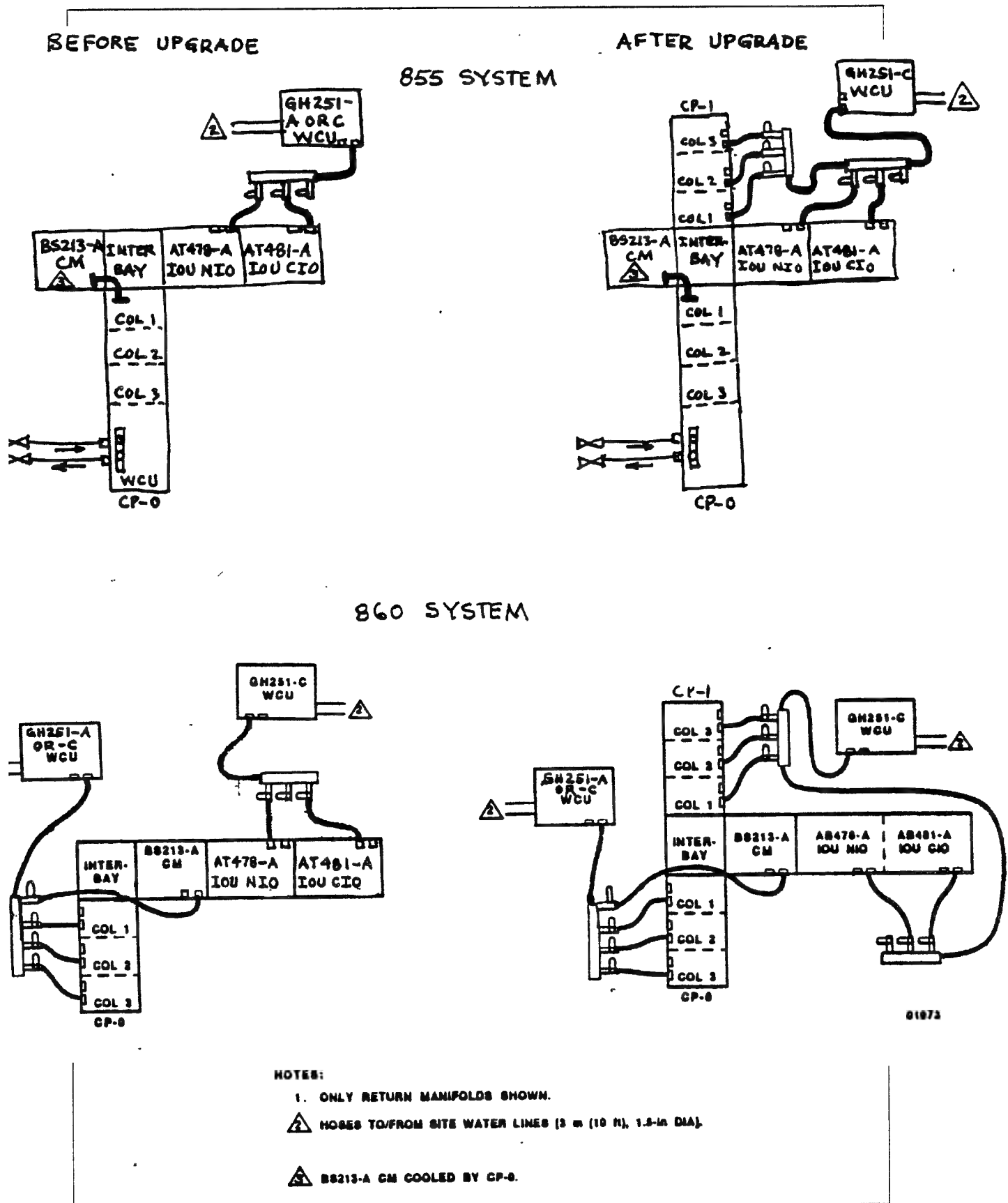


Figure 5-7. Install CP-1 and WCU Only With Existing AT478-A/AT481-A IOU

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Install GH251-C Water Cooling Unit

Installation of the GH251-C Water Cooling Unit consists of the following tasks:

- GH251-C WCU Placement and Removal of Shipping Bars
- Connect Water Hose Assemblies to Water Cooling Unit
- Connect Water Cooling Unit to Water Manifolds
- Verify or change Transformer Connections in GH251-C WCU
- Connect Power to Water Cooling Unit

GH251-C WCU Placement and Removal of Shipping Bars

Use this procedure to place the WCU into position and to remove the shipping bars from the GH251-C WCU. Refer to figure 5-8.

Procedure Prerequisites

- Level floor
- Voltage(s) stated on power label agrees with site wiring
- Floor cutouts complete for plumbing and electrical access to WCU

Tools/parts required

- Two pry bars
- Socket and ratchet wrench set

Procedure

1. Place pre-cut floor tile(s) in appropriate location(s) to accommodate WCU.
2. Using Rol-a-lifts move new WCU into position on raised floor.
3. Loosen (but do not remove) four 9/16-inch bolts which keep red metal shipping bars in place during transit.
4. Use two pry bars or heavy duty screwdrivers, raise WCU's inner frame (near the bolting locations) and slip out red metal shipping bars.
5. Carefully lower WCU frame so it rests on rubber grommets.
6. Store metal shipping bars in bottom of water cooling unit.
7. Tighten bolts, but do not overtighten.

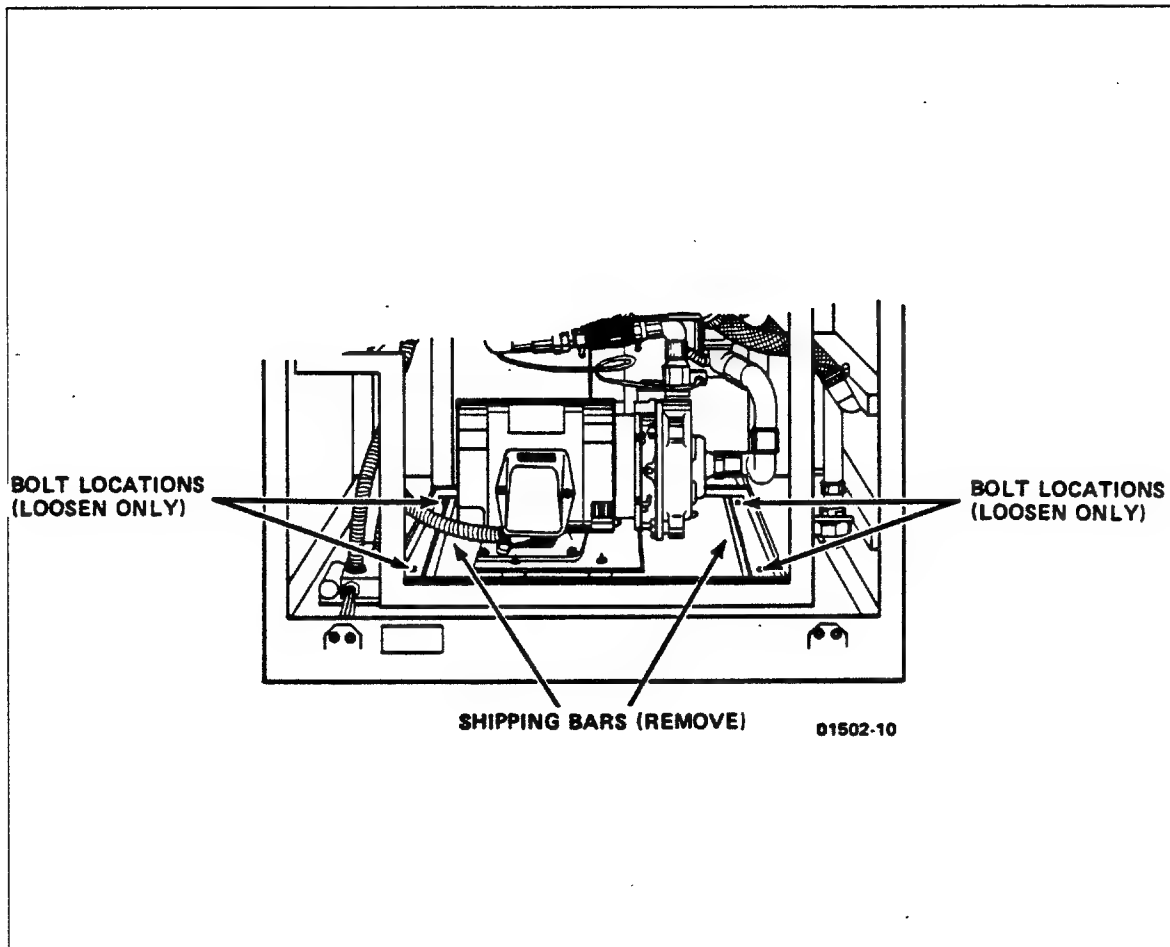


Figure 5-8. Shipping Bar Locations

Connect Water Hoses

Connecting water hoses consists of completing the connections to preinstalled hoses set up for a GH251-C 102-L/min (27-gal/min) water cooling unit system. If another WCU is being added to the system (and no other equipment is removed), locate it according to site floorplan. If another WCU is being substituted for one presently in use, continue with the procedures in this subsection.

Proceed with the water hose connections. Refer to figure 5-9. The procedures are divided into main tasks, as follows:

- Connect water hose assemblies to water cooling unit.
- Connect water cooling unit hoses to water manifolds.

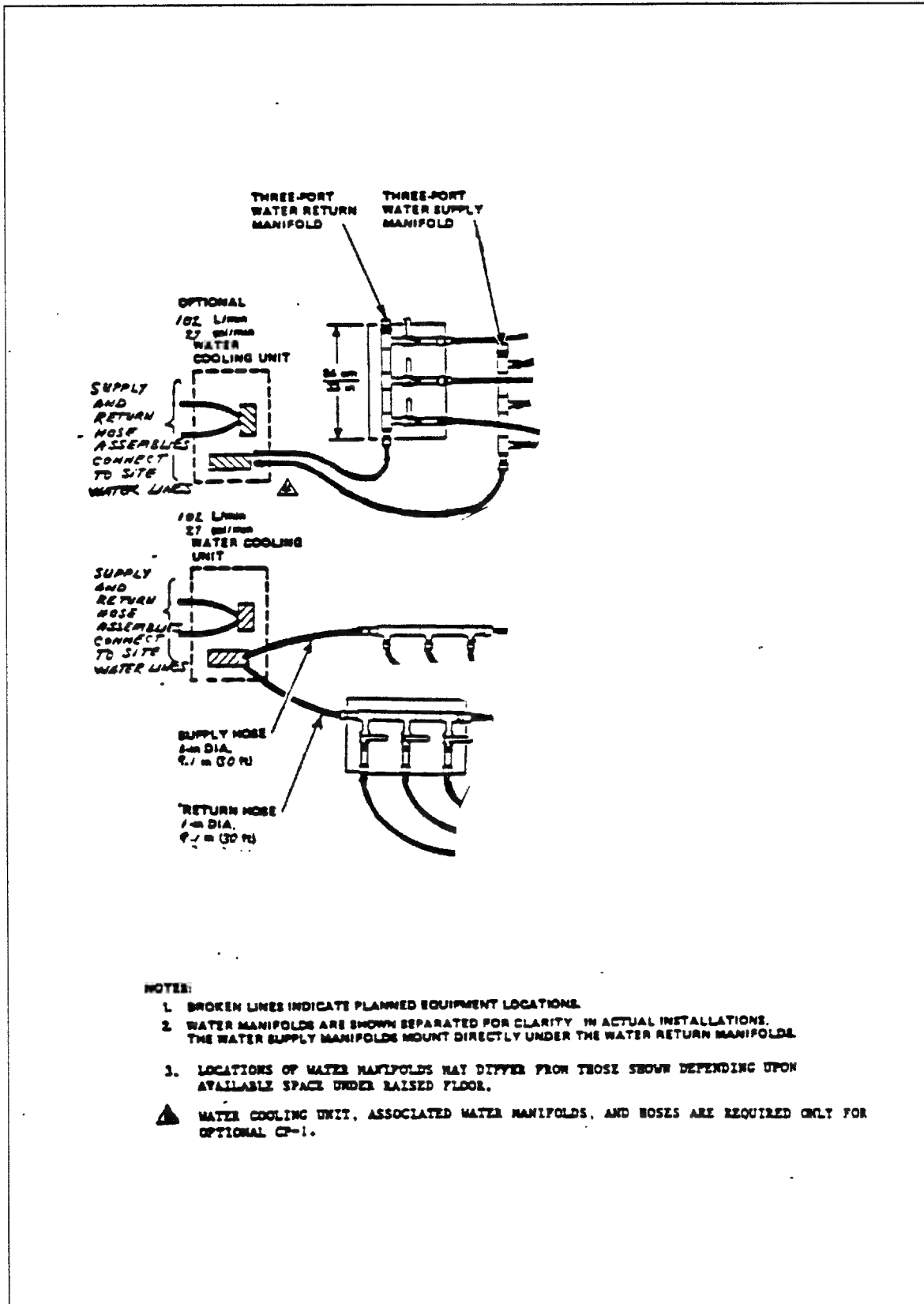


Figure 5-9. Water Hose Connections in GH251-C WCU System

Connect Water Hose Assemblies to Water Cooling Unit

Use this procedure to connect preinstalled site supply and return water hose assemblies to the GH251-C water cooling unit. Repeat this procedure for each new GH251-C Water Cooling Unit added to the computer complex. Refer to figure 5-10.

Procedure prerequisites

- Supply and return water hose assemblies were placed under the raised floor, connected to the site water supply and return valves, and routed to the hose cutouts for the water cooling units during preinstallation procedures.

Procedure

- 1. Remove floor tiles, as required, and pull site water hose assembly ends up and through water cutout into water cooling unit.
- 2. Remove dust caps from site supply and return quick couplings on water cooling unit. Store dust caps at site.
- 3. Verify that gaskets are present in quick couplings on ends of site supply and return water hoses.

CAUTION

Be sure to connect the supply and return hoses to corresponding SUPPLY and RETURN connections on water cooling unit. The water cooling unit does not function properly if these connections are reversed.

After making the hose connections, do not turn water on until instructed to do so. Turning on water prematurely prevents proper bleeding of air from site supply and return water lines.

- 4. Identify site supply hose assembly by observing assembly that contains a box-enclosed venturi meter connection.
- 5. Connect site supply and return hoses to respective site SUPPLY and RETURN quick couplings on water cooling unit. Close both cam levers on quick couplings.
- 6. Insert a warning tag wire, supplied with each coupling, through holes in quick coupling cam levers. Twist wire ends together tightly to ensure that levers are not inadvertently opened.
- 7. Install floor tiles.

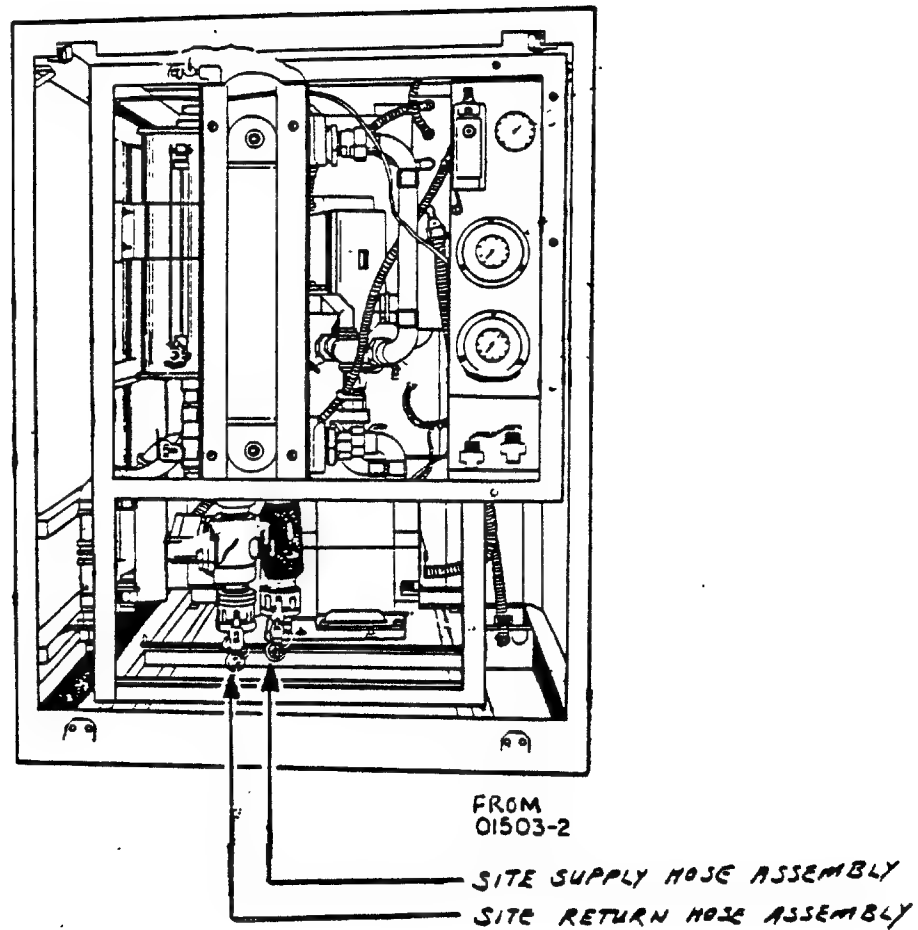


Figure 5-10. Connecting Site Water Hose Assemblies to Water Cooling Unit

Connect Water Cooling Unit to Water Manifolds

Use this procedure to connect preinstalled supply and return hoses on the water supply and return manifolds to the water cooling unit. Refer to figure 5-11.

Procedure prerequisites

- The supply and return water hoses that connect the water cooling unit and the water manifolds were placed under the raised floor and connected to the manifolds during preinstallation.

Procedure

- 1. Remove floor tiles, as required, to pull manifold supply and return water hose ends up through floor and hose cutouts into water cooling unit.
- 2. Remove any dust caps from water cooling unit connections and hose ends. Store dust caps in water cooling unit.
- 3. Verify that gaskets are present in quick couplings on supply and return hoses.

CAUTION

Be sure to connect the supply and return hoses to the corresponding SUPPLY and RETURN connections on the water cooling unit. The water cooling unit does not function properly if these connections are reversed.

- 4. Connect both chassis supply and return hoses to respective SUPPLY and RETURN connections on water cooling unit.

NOTE

The water hose connections for the GH251-C WCU have quick disconnects that require pulling back and releasing of hose connector outer shells to connect hoses to water cooling unit.

- 5. Reinstall floor tiles.

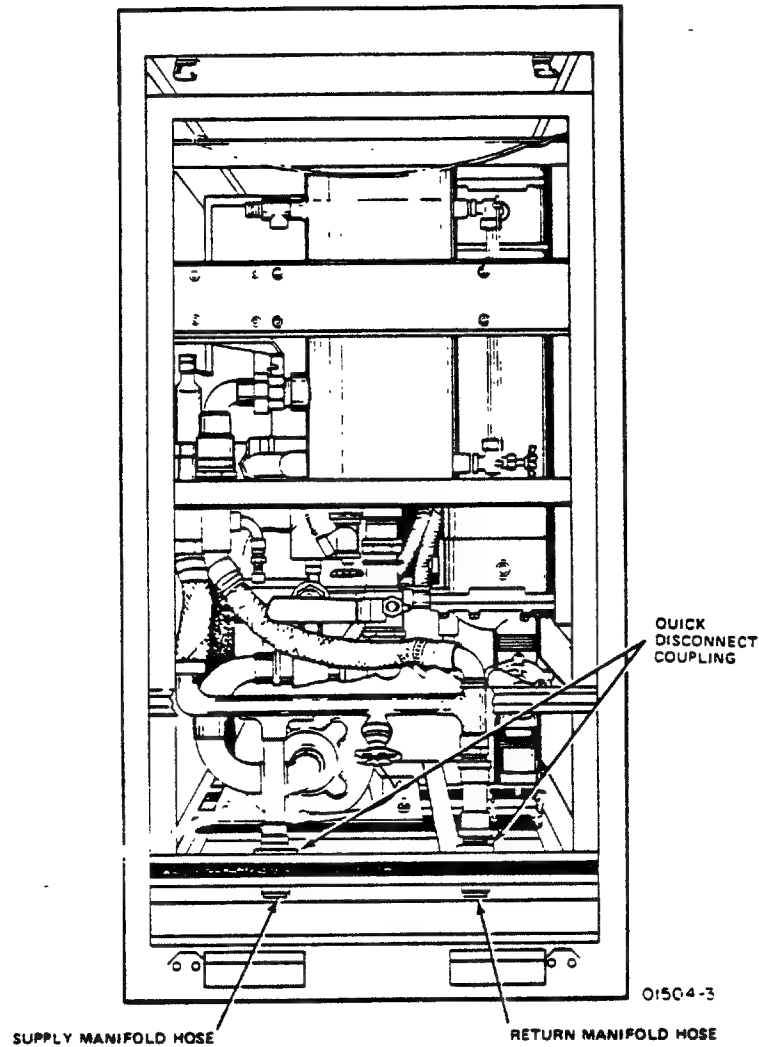


Figure 5-11. Water Manifold Hose Connections to GH251-C WCU

Verify or Change Transformer Connections in GH251-C WCU

Use this procedure to ensure that the single-phase, step-down transformer wiring in the GH251-C cabinet corresponds to the available site voltage: 60-Hz, 3-phase, 120/208-V; 50-Hz, 3-phase, 220/380-V; or 50-Hz, 3-phase, 240/416-V. Refer to figure 5-12.

Tools/parts required

- Slotted screwdriver
- Phillips screwdriver
- 50-Hz power cord when site uses 50-Hz power

Procedure

NOTE

DOES POWER LABEL ON FRAME OR ON TOP OF WCU 50/60-Hz POWER INPUT BOX INDICATE THAT COOLING UNIT IS WIRED FOR SITE VOLTAGE?

- *If yes, go to next procedure..*
- *If no, continue.*

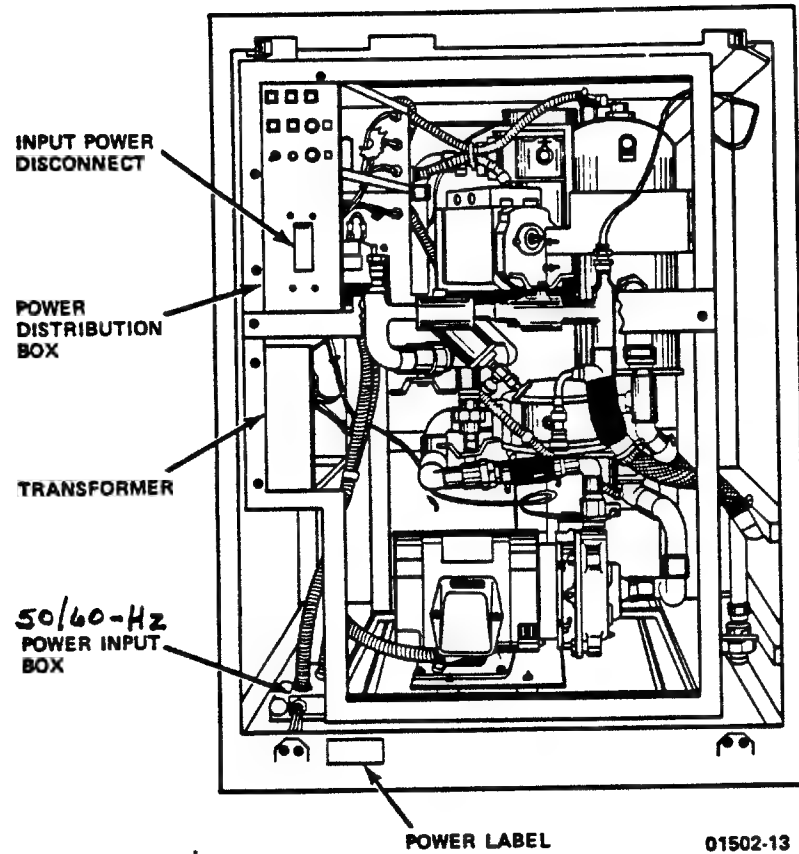
- ___ 1. Verify power-off conditions as follows:
 - ___ a. Verify that wall-mounted circuit breaker that controls 50/60-Hz power to water cooling unit is set to OFF.
 - ___ b. Verify that INPUT POWER DISCONNECT switch on WCU power distribution box is set to OFF.
- ___ 2. Ensure that input power to TB1 in power input box is zero volts to ground on each terminal.
- ___ 3. Remove cover from side of power distribution box to gain access to transformer A1T2.
- ___ 4. Connect transformer A1T2 for correct site voltage using table in figure 5-11.
- ___ 5. Remove cover from motor wire box.

NOTE

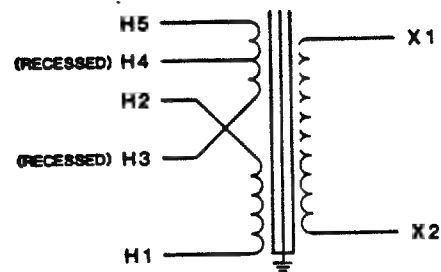
There are nine leads in the motor wire box.

- ___ 6. Ensure that motor is wired for correct site voltage listed as follows:

Low Voltage Line (60-Hz, 208-Volts)	High Voltage Line (50-Hz, 398/415-Volts)
03---3---9	03---3 9---6
02---2---8	02---2 8---5
01---1---7	01---1 1---4
4---5---6	



01502-13



VOLTS	50/60-Hz LINE	JUMPER
416	H1 AND H5	H2 TO H3
380	H1 AND H4	H2 TO H3
208	H1 AND H5	H1 TO H3 H2 TO H5
115	X1 AND X2	

Figure 5-12. GH251-C WCU Transformer Location and Connections

Connect Power to Water Cooling Unit

This water cooling unit has a drop cord with a power plug that connects directly to a preinstalled power plug at the computer site. Use the following procedures to make optional direct wiring connections if a site does not use preinstalled power plugs. Refer to figure 5-13.

NOTE

A licensed electrician must make the following power connections under the supervision of a Control Data customer engineer or computer systems engineer. He must install that wiring according to all local electrical codes.

Procedure prerequisites

- 50/60-Hz power to water cooling unit power wiring is off.
- Preinstallation power inspection is complete, and power wiring is correct.

Tools/parts required

- Phillips screwdriver
- Slotted screwdriver
- Multimeter

Procedure

- 1. Use screwdriver to remove cover from water cooling unit power input box.
- 2. Set INPUT POWER DISCONNECT switch on water cooling unit to OFF.
- 3. Using multimeter set to the ohms scale, check that no short circuits are present between any terminal of TB1 and SAFETY GROUND.
- 4. Disconnect and remove power cord from power input box.
- 5. Pull power wiring from 50/60-Hz wall-mounted circuit breaker up through power cutouts and into power input box.
- 6. Connect power wiring to TB1 in power input box as follows:

50/60-Hz Wall-Mounted Circuit Breaker	Water Cooling Unit Power Input Box
Neutral	TB1-1
Phase 1	TB1-2
Phase 2	TB1-3
Phase 3	TB1-4

- 7. Connect 50/60-Hz utility ground wire to the SAFETY GROUND lug.
- 8. Install cover on power input box.
- 9. Repeat this procedure for second GH251-C WCU if present.

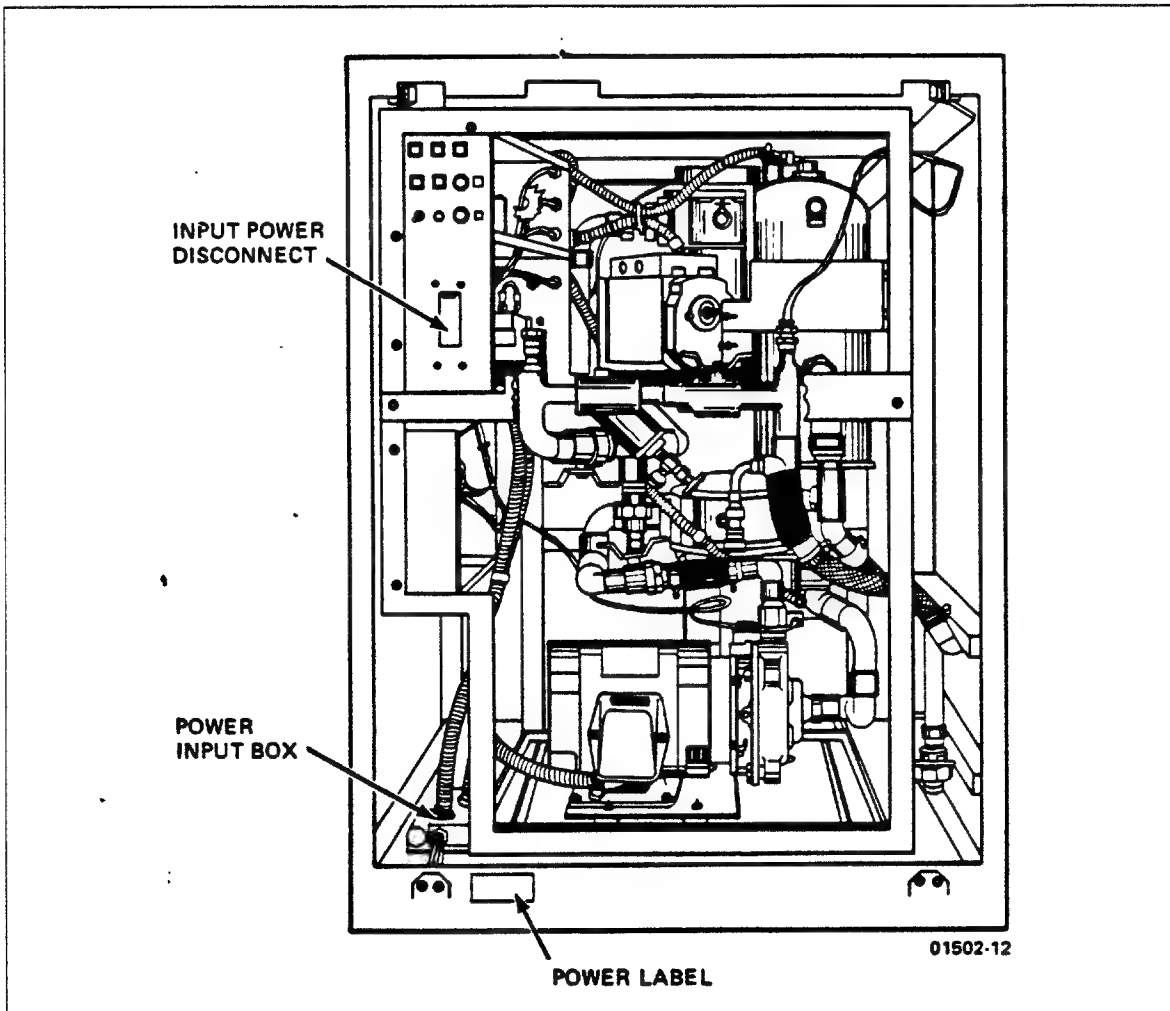


Figure 5-13. 50/60-Hz Power Connections to GH251-C WCU

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Prepare Water Cooling Unit

Preparing the WCU for initial use consists of several tasks, such as:

- Check Valves on GH251-C WCU, CP, CM and IOU.
- Check Pump Rotation on GH251-C WCU.
- Fill Water Tank on GH251-C WCU.
- Bleed Air from GH251-C WCU.
- Adjust Water Flow Rates to CP, CM and IOU.
- Check GH251-C WCU Temperature, Pressure, and Flow.
- GH251-C WCU Low Pressure Switch Adjustment.
- GH251-C WCU High Pressure Switch Adjustment.

Check Valves on GH251-C WCU, CP, CM and IOU

Use this procedure to ensure that the valves on the WCU are in their normal operating positions. Refer to figures 5-14 through 5-17.

Procedure prerequisites

- Connections for 50/60-Hz power to water cooling unit are complete.
- Wall-mounted circuit breaker that controls 50/60-Hz power to water cooling unit is set to OFF.
- Site water is at a temperature of not more than 10 °C (50 °F).

NOTE

Improper valve settings can prevent the water cooling unit from operating, cause a fault to occur a few minutes after the water cooling unit begins operation, or cause water to leak from the water cooling system.

Procedure

- ___ 1. Check valves on front of water cooling unit for the following:
 - ___ a. Access valve on heat exchanger has a valve cap.
 - ___ b. Sight glass drain valve is closed, fully clockwise.
 - ___ c. Sight glass shutoff valve is open, fully counterclockwise.
 - ___ d. Pump drain valve is closed, fully clockwise.

NOTE

Heat exchangers that have an air bleeder valve have two zinc anodes: one on the top of the heat exchanger and one on the bottom.

- e. Insulation covering zinc anodes has been cut away to expose anodes for observation of possible water leakage.
- f. Air bleeder valve on heat exchanger is closed.

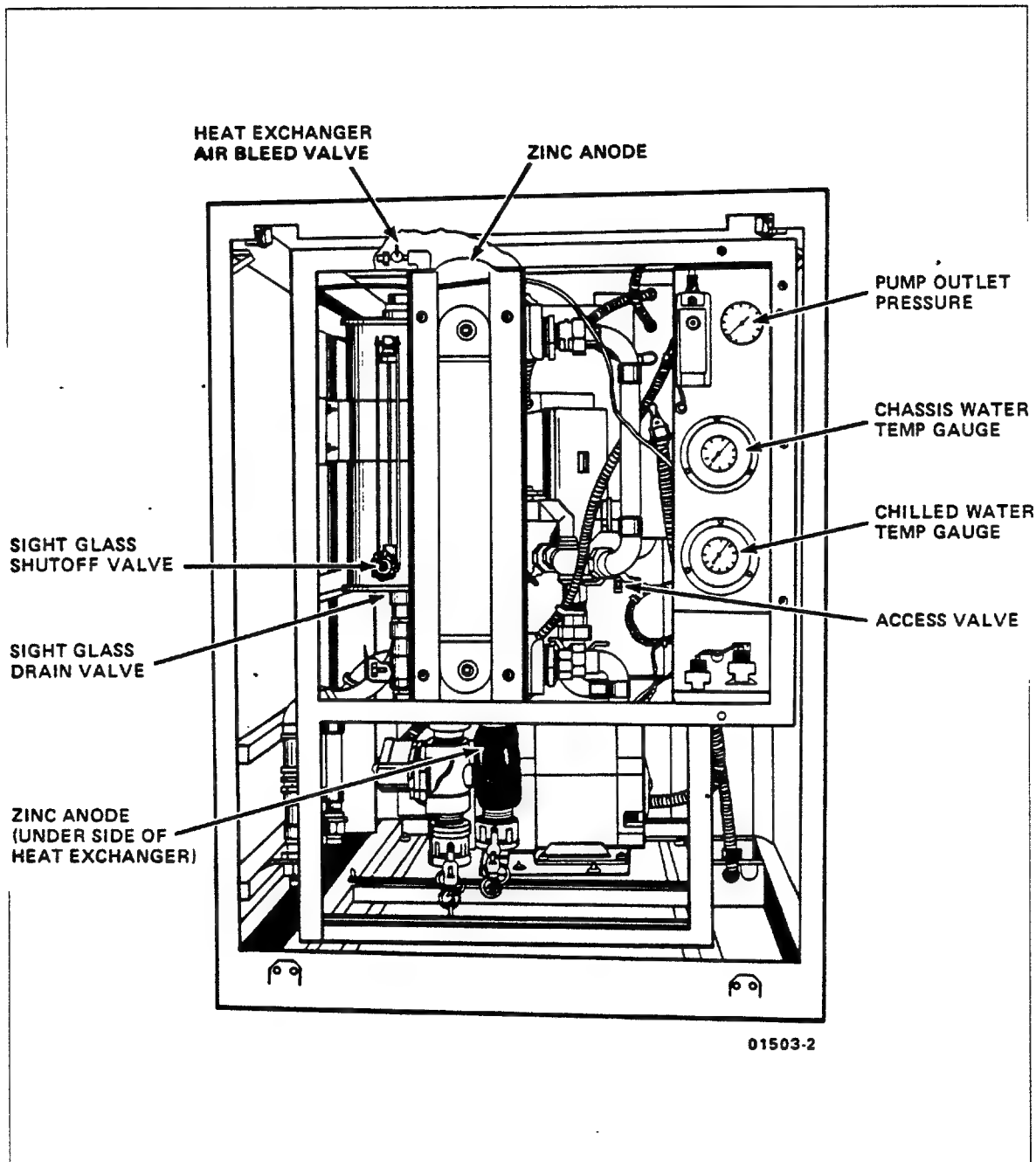


Figure 5-14. Valve Locations on GH251-C WCU (Front)

- ___ 2. Check valves on rear of water cooling unit for the following:
 - ___ a. Site water air vent on heat exchanger is closed, fully clockwise.
 - ___ b. Water tank drain valve is closed, fully clockwise.
 - ___ c. Pump inlet and outlet valves are open, parallel to pipe.
 - ___ d. Strainer inlet and outlet valves are open, parallel to pipe.
 - ___ e. Strainer drain valve is closed, fully clockwise.
 - ___ f. Water tank inlet valve is open, parallel to pipe.

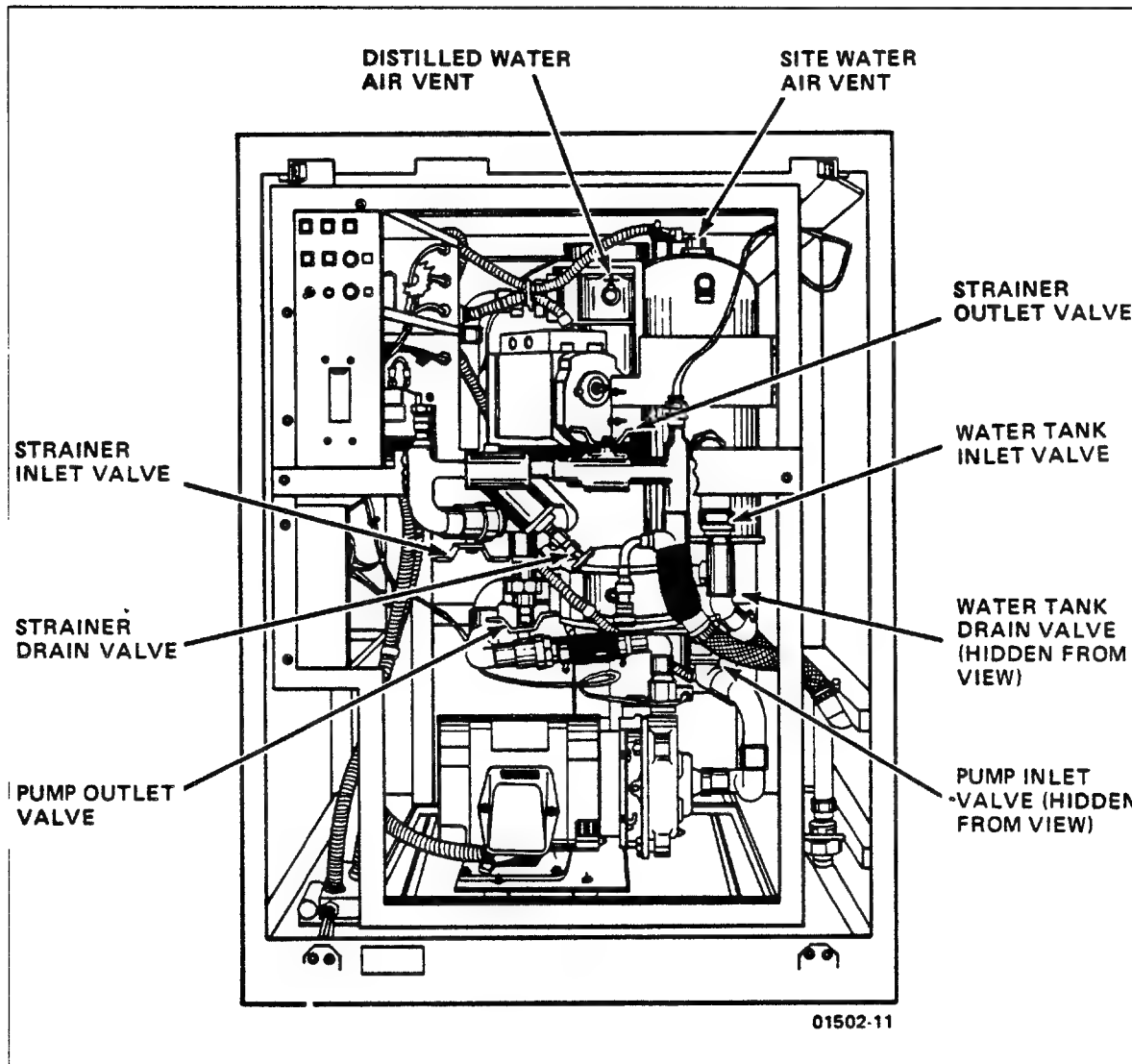


Figure 5-15. Valve Locations on GH251-C WCU (Rear)

- ___ 3. Close bypass valve on side of water cooling unit by turning it fully clockwise.
- ___ 4. Open all supply and return valves in columns of CP-0 and CP-1 (if present).
- ___ 5. Close flow control valves on water return manifold(s) under raised floor.

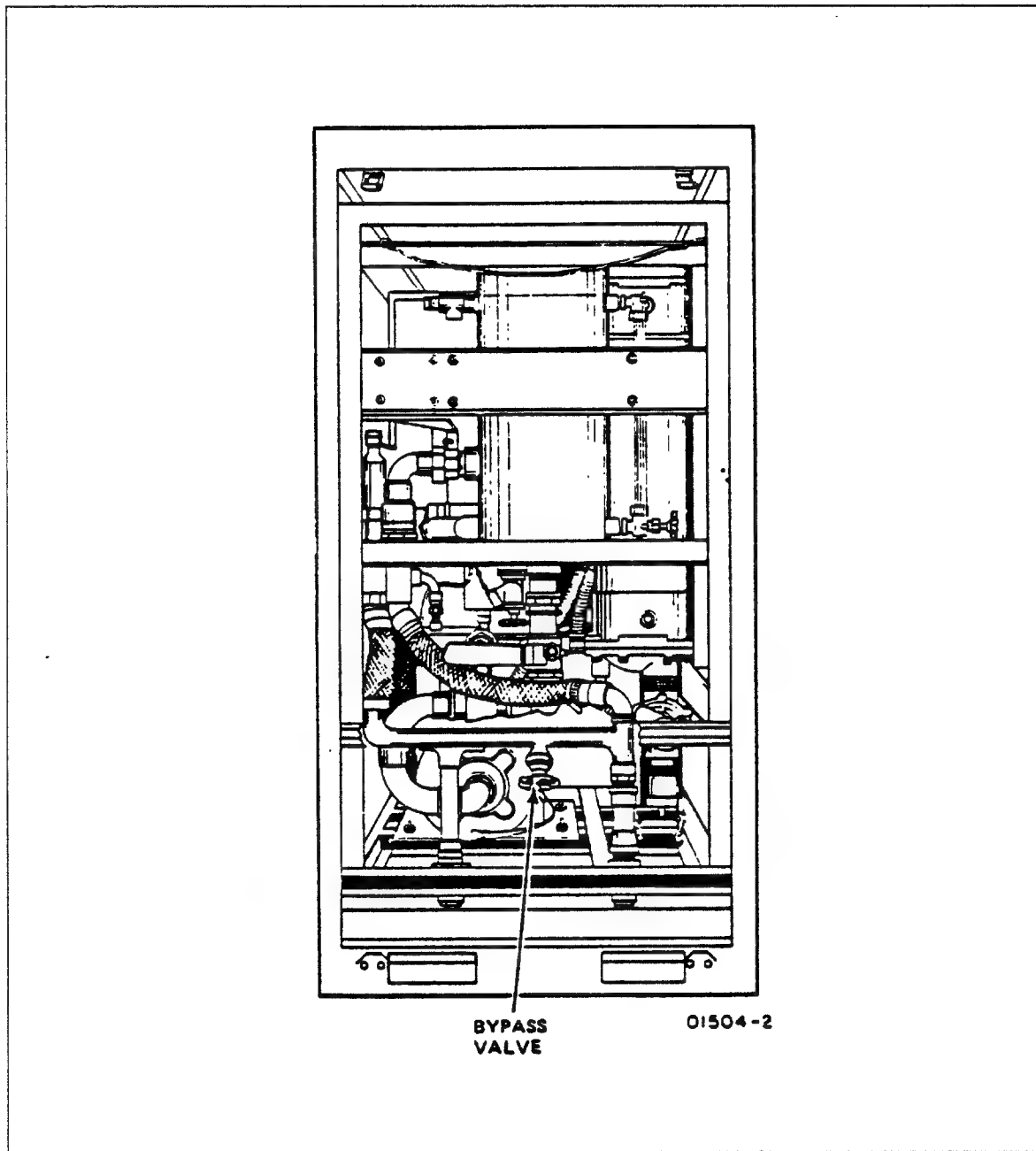


Figure 5-16. Bypass Valve on GH251-C WCU (Side)

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- 6. Ensure that 3-way valve handles on site supply and return hose assemblies are set to position 1.

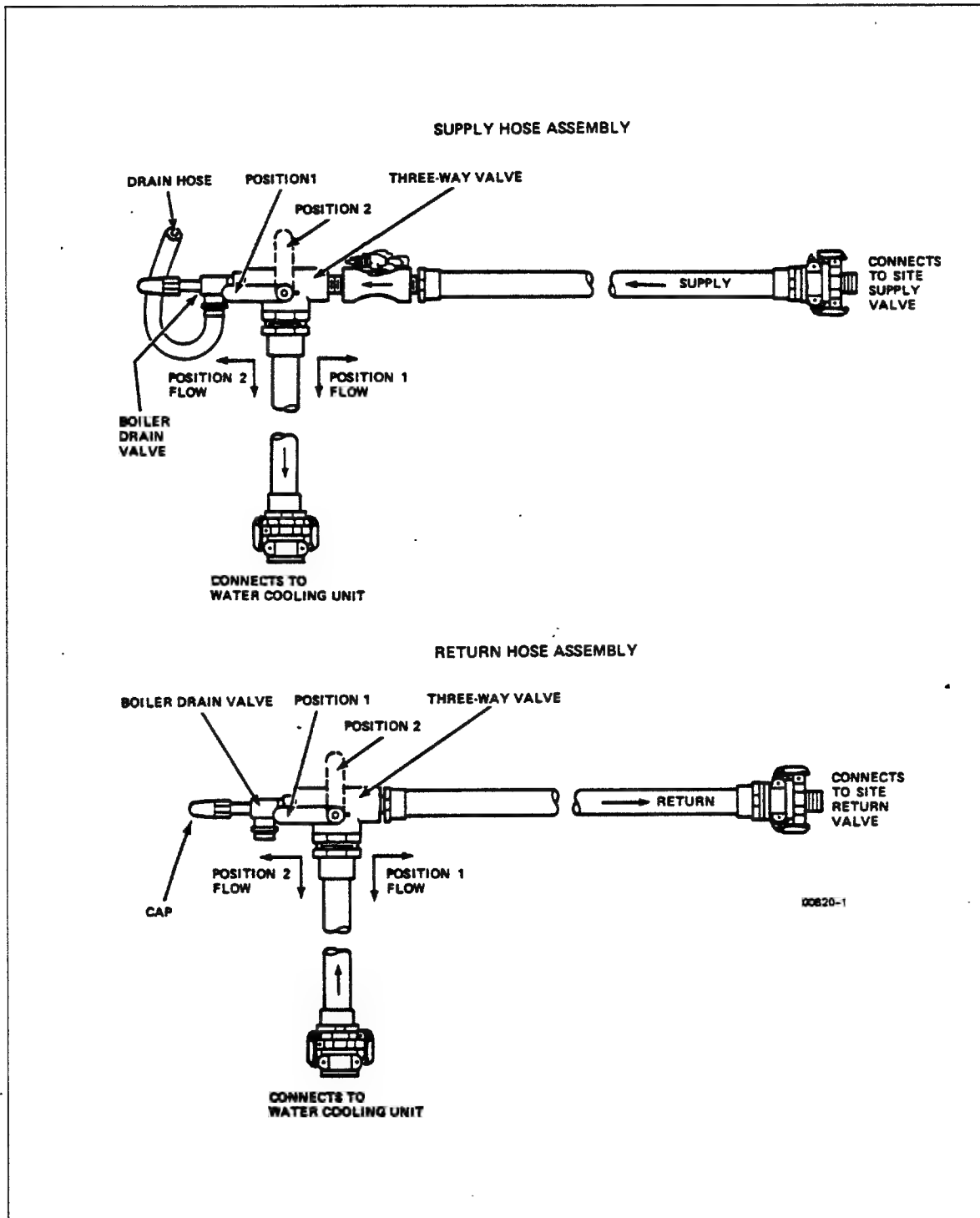


Figure 5-17. Site Supply and Return Hose Assemblies - 3-Way Valves

Check Pump Rotation on GH251-C WCU

Use this procedure to ensure that the pump motor on the GH251-C rotates in the correct direction after the application of power. Refer to figure 5-18.

Procedure prerequisites

- Power connections to water cooling unit are correct and complete.
- Wall-mounted 50/60-Hz circuit breaker supplying power to WCU is OFF.
- Valves for the WCU are set according to previous procedures.

Tools/parts required

- Distilled water, 7.6 L (2 gal). Later procedures require additional water to complete filling of water cooling unit water tank.
- Funnel.
- Adjustable wrench.

Procedure

- 1. Set INPUT POWER DISCONNECT circuit breaker on water cooling unit to OFF.
- 2. Set mode switch on control panel at rear of unit to LOCAL.
- 3. Set wall-mounted circuit breaker that controls WCU 50/60-Hz power to ON.
- 4. Use adjustable wrench to remove fill plug from top of water tank.
- 5. Use funnel to add 7.6 L (2 gal) of distilled water to water tank.
- 6. Loosen water pump air bleed valve enough to allow water to seep from around valve and release any trapped air.
- 7. Rotate pump by momentarily applying 50/60-Hz power by setting INPUT POWER DISCONNECT circuit breaker at rear of cooling unit to ON and then to OFF.

- 8. Observe rear of water pump motor (look into motor housing opening) as it slows down. Motor must rotate in same direction as arrow on pump casing. If motor does not rotate in correct direction, perform the following steps:
 - a. Set wall-mounted circuit breaker that controls WCU 50/60-Hz power to OFF.
 - b. Remove cover plate from 50/60-Hz power input box on water cooling unit. Use multimeter to verify no voltage is present on any terminal of A5TB1.
 - c. Interchange any two wires connected to tb1-2, tb1-3, and tb1-4 in 50/60-Hz power input box.
 - d. Set wall-mounted circuit breaker that controls WCU 50/60-Hz power to ON.
 - e. Repeat steps 7 and 8 to ensure correct rotation of motor.

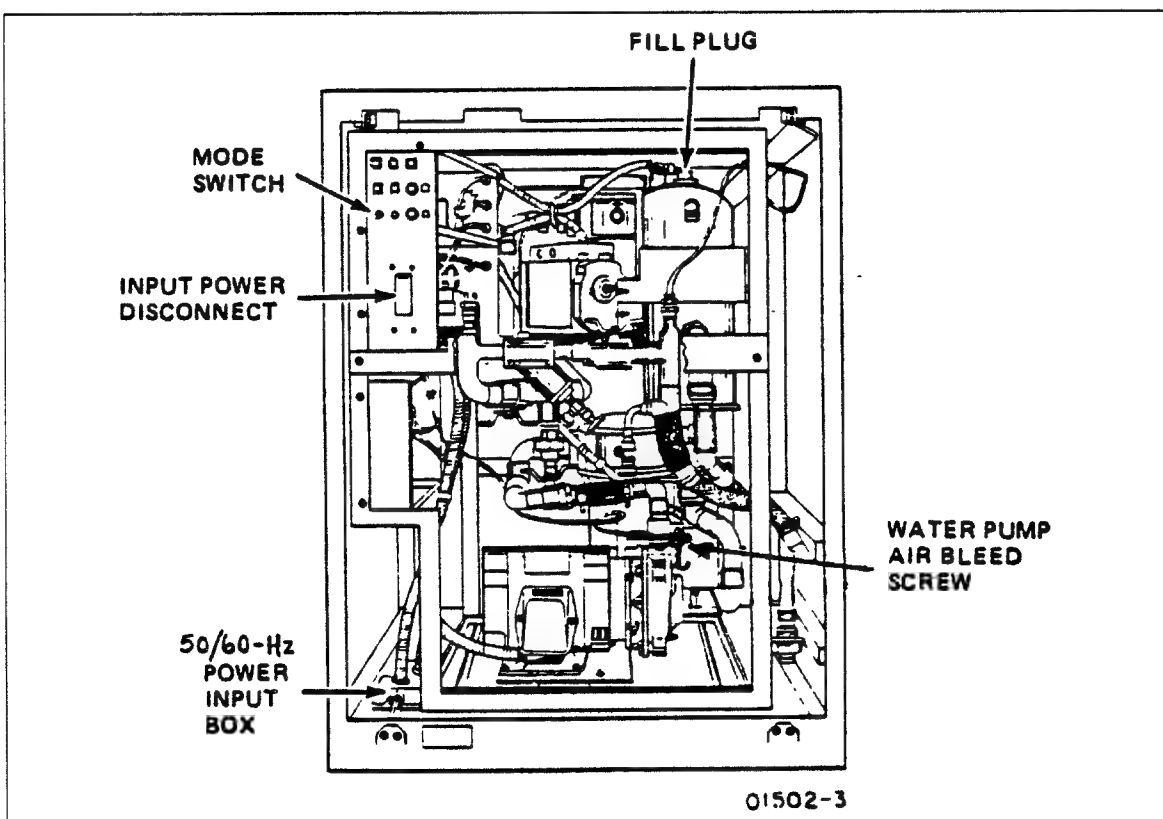


Figure 5-18. Pump Rotation Check on GH251-C WCU

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- ___ 9. Set wall-mounted circuit breaker that controls 50/60-Hz power to water cooling unit to OFF.
- ___ 10. Replace cover plate on 50/60-Hz power input box, if removed.
- ___ 11. Do not replace fill plug on top of water tank at this time.

Fill Water Tank in GH251-C WCU

Use this procedure to complete the filling of the water tank in the GH251-C WCU. Refer to figures 5-19, 5-20, and 5-21.

Procedure prerequisites

- Previous water cooling unit procedures are complete.
- Water tank fill plug is removed from water cooling unit, and tank contains 7.6 L (2 gal) of distilled water from pump rotation check.
- Mode switch on WCU control panel is set to LOCAL.

Tools/parts required

- Distilled water, approximately 30.3 L (8 gal)
- Cobratec corrosion inhibitor
- Biocide chemical microorganism control
- Water treatment pH indicator kit
- Disposable gloves
- Funnel
- Safety glasses
- Water tank drain hose
- Empty water container, 4 to 7.6 L (1 to 2 gal)

Procedure

- 1. Set wall-mounted 50/60 Hz circuit breaker that controls WCU power to ON:

NOTE

Water added to the water tank may appear in the sight glass to have a green/blue or milky tint. These conditions are due either to antifreeze residue or excessive air bubbles. The green/blue tint is a normal condition that clears up in several hours; however, the milky color indicates an excessive amount of air bubbles in the system due to misadjustment of the bypass valve.

NOTE

Do not fill tank more than three-fourths full with power removed.

- 2. Apply power to water pump by setting INPUT POWER DISCONNECT circuit breaker on rear of unit to ON. After water pump motor runs a few seconds, water level in sight glass drops as water is pumped throughout cooling system.
- 3. Add water as necessary to maintain water level at three-fourths full in sight glass.

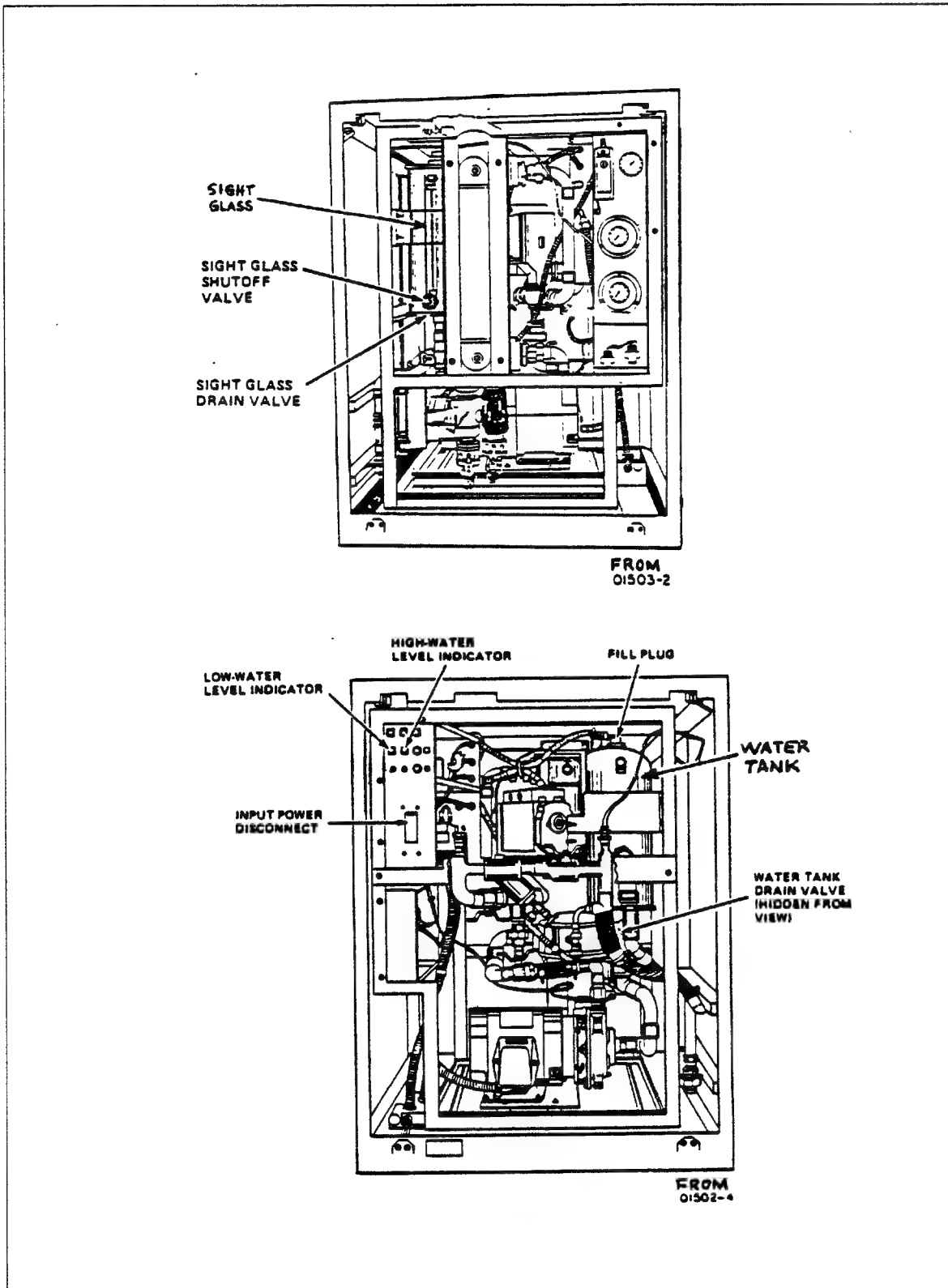


Figure 5-19. Filling Water Tank on GH251-C WCU

NOTE

To avoid LOW WATER LEVEL faults, open water valves on equipment one at a time.

- If water pump motor stops operating while water is being added, and LOW WATER LEVEL indicator on power disconnect box lights, set INPUT POWER DISCONNECT switch to OFF and repeat steps 2, 3, and 4.
- If water pump motor stops operating and HIGH WATER LEVEL indicator on power disconnect box lights, perform the following steps:
 - ___ a. Set INPUT POWER DISCONNECT switch on water cooling unit to OFF.
 - ___ b. Attach drain hose to water tank drain valve, and place hose end in empty water container.
 - ___ c. Open water tank drain valve, and drain water into container until sight glass indicates three-fourths full.
 - ___ d. Close drain valve.
 - ___ e. Repeat steps 3 and 4 until water level in sight glass remains at three-fourths full.
 - ___ f. Remove drain hose and container.
- ___ 4. Permit water cooling unit to operate for a time to allow trapped air to circulate through system and escape from water tank. Bubbles stop surfacing in tank when trapped air is released.
- ___ 5. Inspect all water connections in WCU, CM, CP-0, CP-1 (if present) and IOU for leaks. Correct any leaking connections.

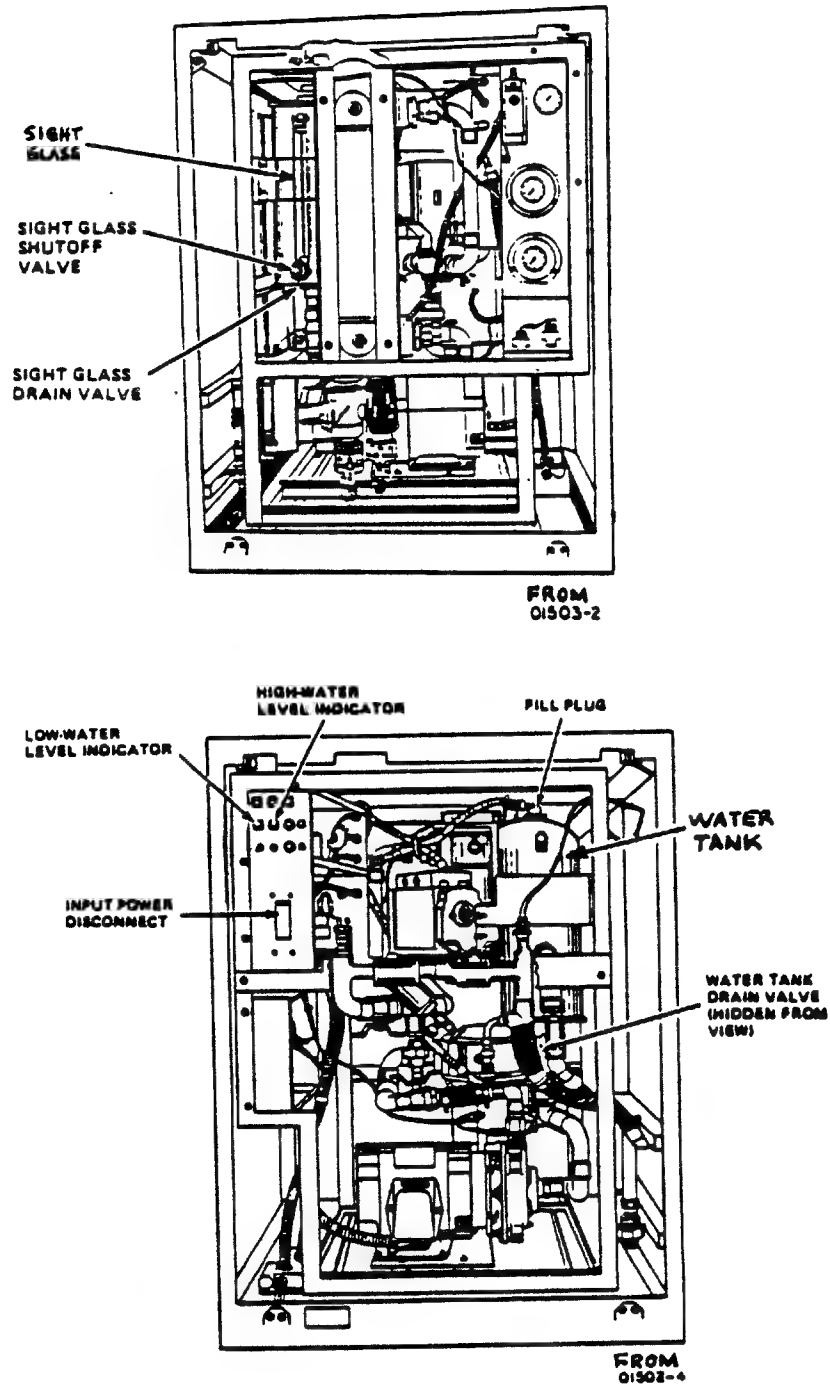


Figure 5-20. Filling Water Tank on GH251-C WCU

NOTE

To avoid erroneous pH indications, do not perform step 7 until the proper amount of water is circulating in all equipment to which the newly-installed WCU is connected.

- 6. Check alkalinity of water in water cooling unit, using water treatment pH indicator kit as follows:
- a. Drain small amount of water from water tank drain valve into clean container. Pour some water from container into both color viewing tubes. Rinse tubes thoroughly and leave them empty.

WARNING

The chemicals in the wide range 4 pH indicator solution may be hazardous to the health and safety of the user if inappropriately handled. Read all warnings included with the test kit before using it.

- b. Pour additional water from container into both color viewing tubes, filling tubes only to their 5-mL marks.
- c. Add six drops of wide range 4 pH indicator solution to one sample tube. Cover tube with stopper, and swirl it to mix solution with water sample.
- d. Insert tube with treated water into right opening of color comparator.
- e. Insert tube with untreated water sample into left opening of color comparator.

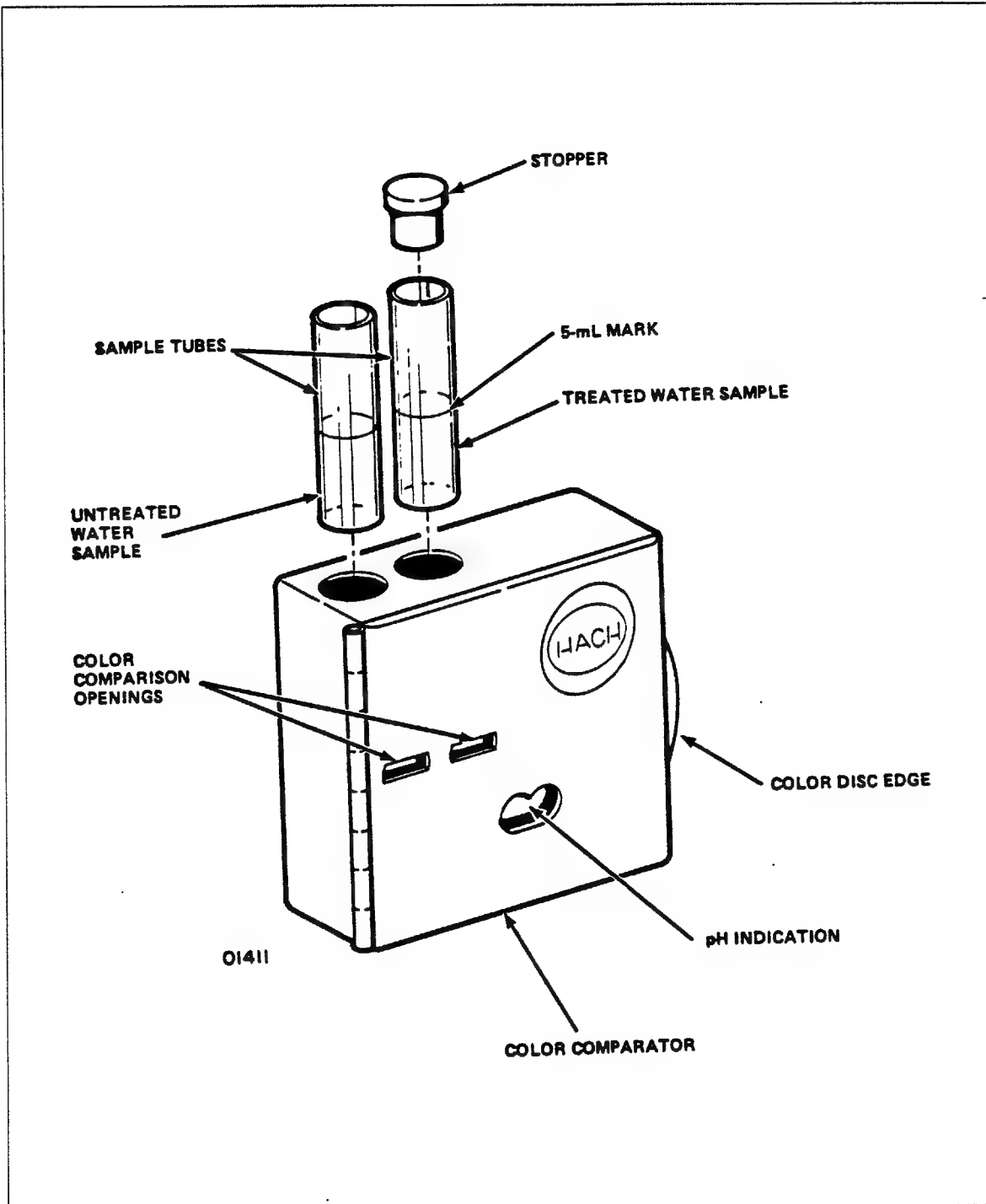


Figure 5-21. Water Treatment pH Indicator Kit

— f. Hold color comparator up to light source and view color comparator openings. Rotate color disc by turning its edge to obtain color match in openings.

— g. Read pH indicator on front of color comparator. Correct alkalinity (pH) indication is between 7.0 and 8.5. Rinse sample tubes.

If pH is more than 8.5, dilute water in water cooling unit as follows:

— 1) Drain 3.8 L (1-gal) of water from water cooling unit.

— 2) Add 3.8 L (1-gal) of untreated distilled water to water cooling unit.

— 3) Wait 15-min and repeat this entire step to ensure correct pH level between 7.0 and 8.5.

If pH is less than 7.0 increase pH level as follows:

— 1) Put on safety glasses and disposable rubber or plastic gloves.

WARNING

Do not inhale vapors from Cobratec or allow it to contact skin or eyes. Cobratec contains a sodium hydroxide solution, which can severely burn skin and eyes and cause harm if a large quantity is inhaled.

— 2) Add one drop of Cobratec corrosion inhibitor to each 3.8 L (1 gal) of water in water tank. Cobratec has an indefinite shelf life.

— 3) Wait 15-min and repeat this entire step to ensure correct pH level between 7.0 and 8.5

— 7. Rinse and store sample tubes in color comparator.

— 8. Leave safety glasses and gloves on.

WARNING

Do not inhale vapors from biocide chemical microorganism control or allow it to contact skin or eyes. Chemical microorganism control contains polyoxyethylene (dimethyliminio) ethylene (dimethyliminio) ethylene dichloride, a substance that can cause severe eye and skin irritation.

- ___ 9. Wait at least 15 min after adding Cobratec. Then add 4 drops of biocide chemical microorganism control to each 3.8 L (1 gal) of water in tank. Note expiration date on biocide container to ensure its usability.
- ___ 10. Remove safety glasses and gloves.
- ___ 11. Do not install fill plug on top of water tank at this time.

NOTE

Continue operation of water cooling unit to perform remaining checkout procedures.

Bleed Air From GH251-C WCU

Use this procedure to release any trapped air in the site water lines of the water cooling unit. Refer to figure 5-22.

Procedure prerequisites

- Previous water cooling unit procedures are complete
- Water cooling unit is operating in local mode

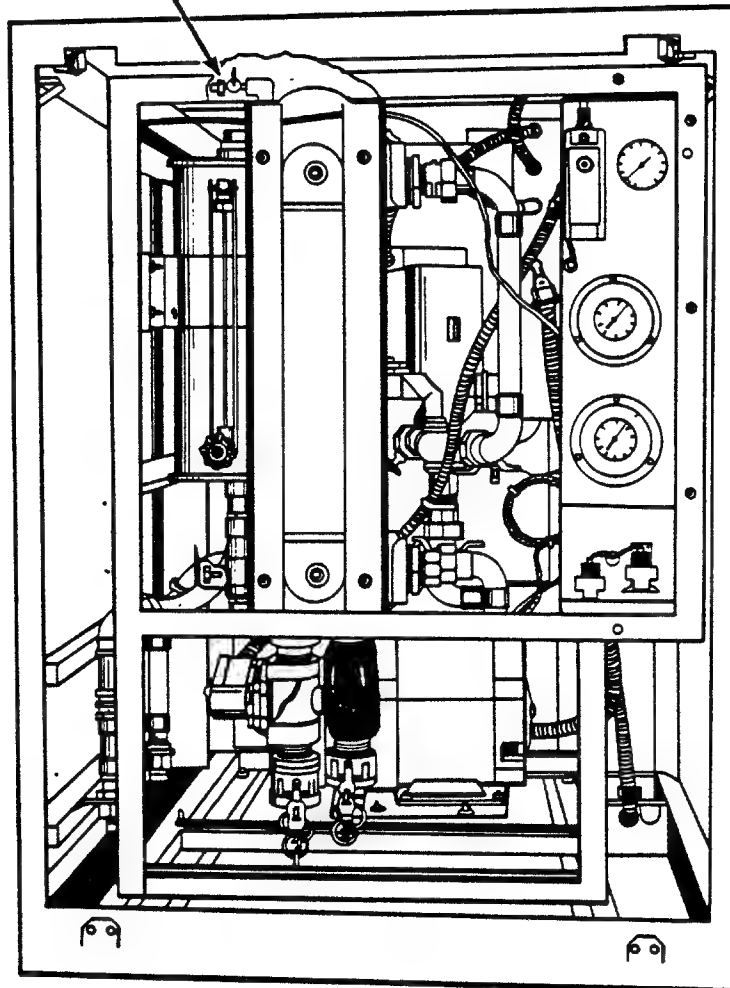
Tools/parts required

- Paper tissues or cloth towel for absorbing water

Procedure

- ___ 1. Open site (customer) water supply and return valves to water cooling unit.
- ___ 2. Place towel or tissues around heat exchanger air bleed valve to absorb water.
- ___ 3. Open air bleed valve slightly until air escapes from valve and water begins spraying out. Close valve.
- ___ 4. Remove towel or tissues.
- ___ 5. Allow water cooling unit to operate several hours. This action permits air to escape from chassis water before installing fill plug on top of water cooling unit water tank.

HEAT EXCHANGER
AIR BLEED VALVE
FOR SITE WATER



01503-3

Figure 5-22. Air Bleed Valve in GH251-C WCU

Adjust Water Flow Rates to CP, CM, and IOU

Use the following procedures to adjust the water manifold flow rates to the CP-0, CP-1 (if present), CM, IOU NIO cabinet, IOU CIO cabinet, and water cooling units. Refer to figures 5-23 and 5-24.

Procedure prerequisites

- All previous procedures in this chapter have been completed and the WCU is operating.

Tools/parts required

- Distilled water, as required to maintain water level in water cooling unit
- Funnel
- Water tank drain hose
- Empty water container, 4 L to 7.6 L (1 gal to 2 gal)

Procedure

1. Remove floor tiles above return water manifolds.
2. Remove flow meter covers by pulling them upward and off.
3. Set flow meters on water return manifolds by turning valve adjust handles to obtain following rates. Turning valve adjust handles counterclockwise increases water flow rate.

NOTE

The following flow rates are minimum. They may be somewhat higher when 60-Hz voltage is connected to the WCU but should be as close as possible to the rates shown for a 50-Hz voltage connection.

- a. CP-0 and CP-1 (if present) column 1 flow meters to 11.4 L (3 gal) per min.
 - b. CP-0 and CP-1 (if present) column 2 flow meters to 11.4 L (3 gal) per min.
 - c. CP-0 and CP-1 (if present) column 3 flow meters to 15.1 L (4 gal) per min.
 - d. CM flow meter to 7.6 L (2 gal) per min.
 - e. IOU NIO cabinet flow meter to 15.1 L (4 gal) per min.
 - f. IOU CIO cabinet flow meter to 15.1 L (4 gal) per min.
4. Repeat step 3 until all flow rates are adjusted correctly.

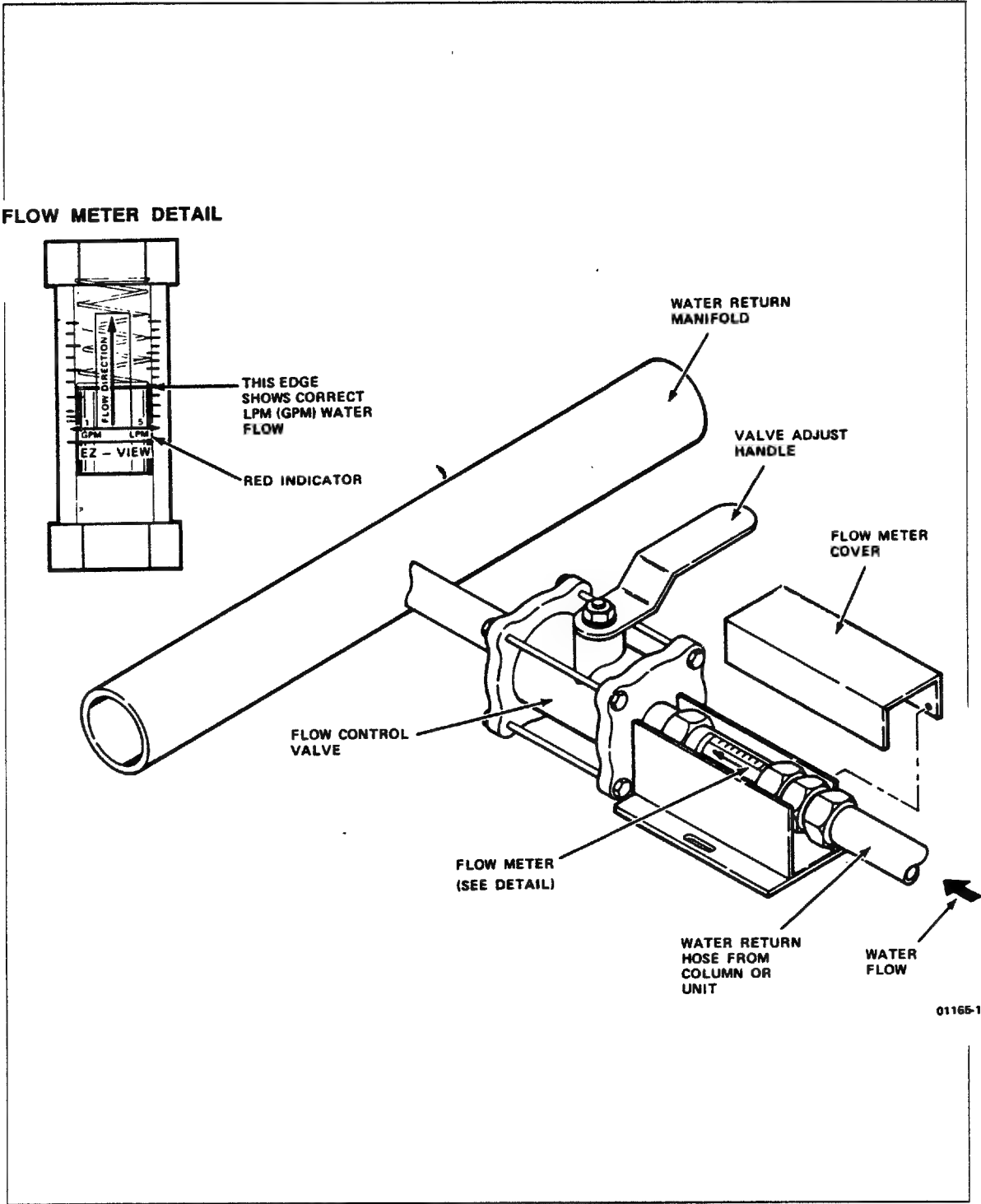


Figure 5-23. Water Flow Meters and Adjust Handles

- ___ 5. Check PUMP OUTLET PRESSURE gauge on water cooling unit to ensure that it reads between 70 and 92 psi for 60 Hz units or 40 to 60 psi for 50 Hz units. To obtain this reading, adjust bypass valve on water cooling unit.
- ___ 6. Repeat steps 3, 4, and 5 until all flow rates are adjusted correctly.
- ___ 7. Do not install flow meter covers until later.
- ___ 8. Visually check water level at water cooling unit sight glass.
 - If water level in sight glass does not indicate three-fourths full, proceed to step 9.
 - If water level in sight glass indicates three-fourths full, proceed to step 10.
- ___ 9. Use funnel to add distilled water to water tank, as necessary, until water level in sight glass indicates three-fourths full.
 - If water pump motor stops operating and HIGH WATER LEVEL indicator on power disconnect box lights, perform the following tasks:
 - ___ a. Set INPUT POWER DISCONNECT switch on rear of water cooling unit to OFF.
 - ___ b. Attach drain hose to water tank drain valve. Place opposite end of drain hose in an empty water container.
 - ___ c. Open water tank drain valve and drain water into container until sight glass indicates three-fourths full.
 - ___ d. Close drain valve.
 - ___ e. Set INPUT POWER DISCONNECT switch to ON.
 - ___ f. Repeat steps 6 and 7 until water level in sight glass remains at three-fourths full.
 - ___ g. Remove drain hose and container.
- ___ 10. Install floor tiles.

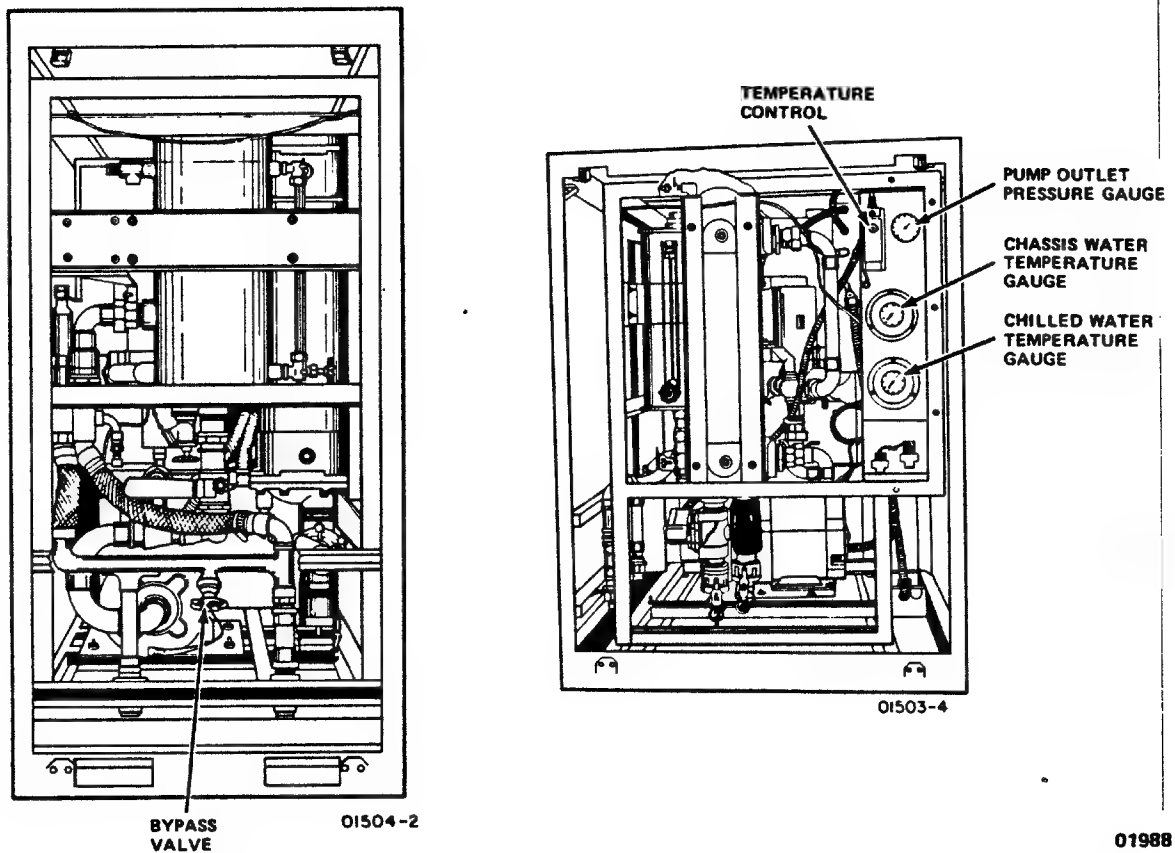


Figure 5-24. Pressure Gauges on GH251-C WCU.

Check GH251-C WCU Temperature, Pressure, and Flow

Use this procedure to verify that the water cooling unit temperature, pressure, and flow rate are within specifications. Refer to figure 5-25.

Procedure prerequisites

- The water cooling unit must have been operating for a minimum of 15 min

Procedure

NOTE

Opening bypass valve too far introduces turbulence into the WCU. Therefore, open bypass valve gradually in step 1.

- 1. Read PUMP OUTLET PRESSURE gauge. Open bypass valve gradually, if necessary, to obtain following pressure:
 - a. For 60-Hz power, 517 kPa to 634 kPa (75 psi to 92 psi).
 - b. For 50-Hz power, 276 kPa to 414 kPa (40 psi to 60 psi).
- 2. Read CHASSIS WATER TEMPERATURE gauge. Verify gauge indicates between 16.7°C and 21.5°C (62°F and 65°F), 18.3°C (63°F) nominal. If gauge does not indicate a temperature within this range, turn TEMPERATURE CONTROL knob counterclockwise to decrease temperature or clockwise to increase temperature. Wait 15 min for temperature change to register accurately on gauge.
- 3. Read CHILLED WATER TEMPERATURE gauge. Verify that gauge indicates between 4.4°C and 10.0°C (40°F and 50°F).

NOTE

The following step is necessary because of interaction between the pump pressure and the water flow rates.

- 4. Repeat this and previous procedure until water cooling unit temperature, pressure, and flow gauge readings are correct.

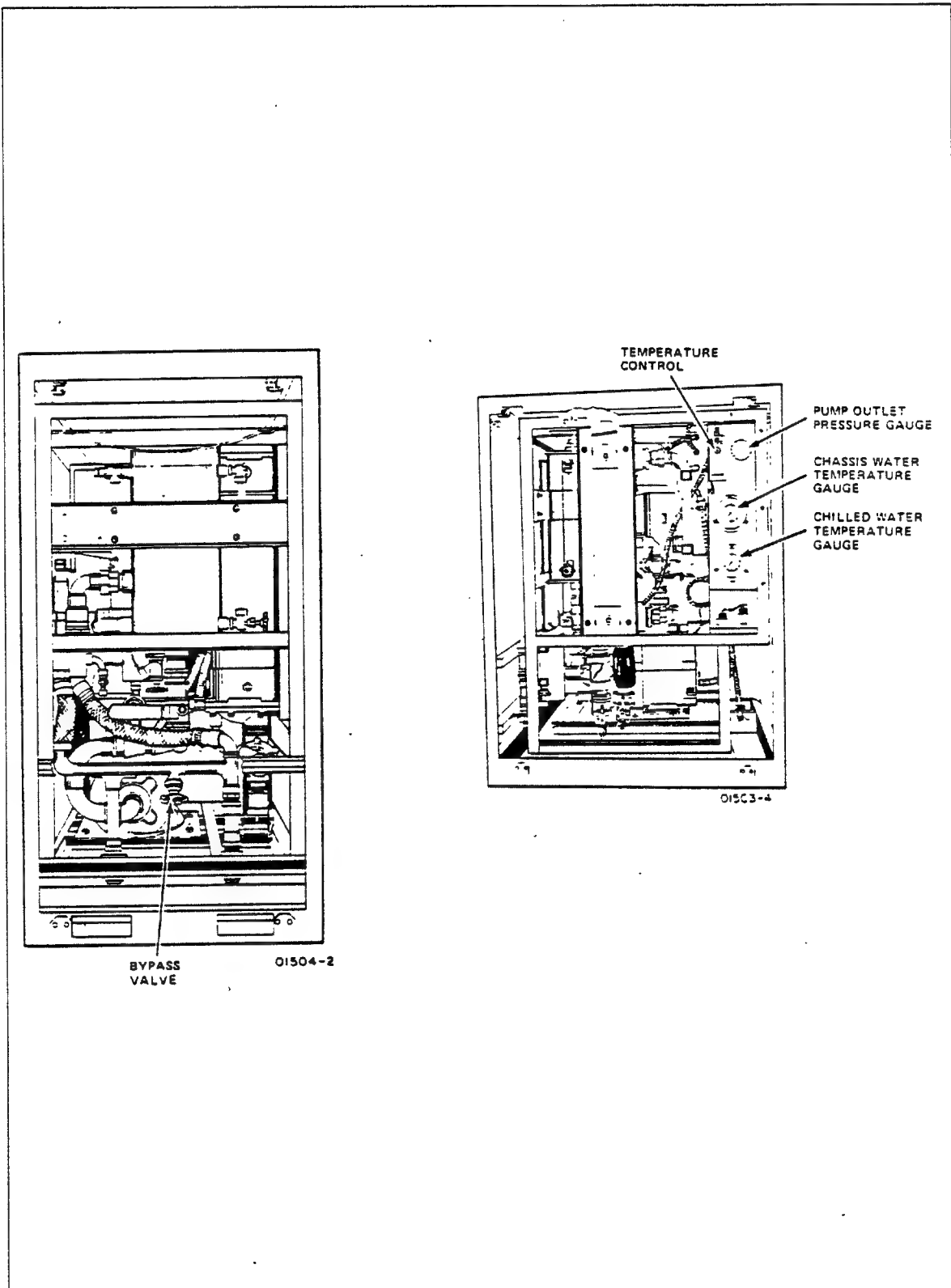


Figure 5-25. GH251-C WCU Temperature, Pressure, and Flow Rate Meters

Should
be
H2 hdg
↓

GH251-C WCU Low Pressure Switch Adjustment

Use this procedure to adjust the low pressure switch (S1). Refer to figure 5-26.

Procedure prerequisites

- Water cooling unit is operating and all other Prepare Water Cooling Unit procedures have been completed.

Tools/parts required

- Slotted screwdriver
- Phillips screwdriver

Procedure

1. Remove front cover from water cooling unit.

WARNING

50/60-Hz power is present behind switch-box cover of GH251-C control assembly. Take necessary precautions to prevent personal injury.

2. Remove top screws and loosen bottom screws in switch-box cover of pressure control assembly and remove cover.
3. Use a screwdriver to turn set screw on S1 CCW approximately two turns.
4. Slowly close pump inlet valve until PUMP OUTLET PRESSURE gauge indicates _ _ _ _ kPa (_ _ _ _ psi).
5. Allow pressure to stabilize.
6. Slowly adjust set screw CW until switch trips.
7. Fully open pump inlet valve.
8. Replace switch enclosure and switch box cover.

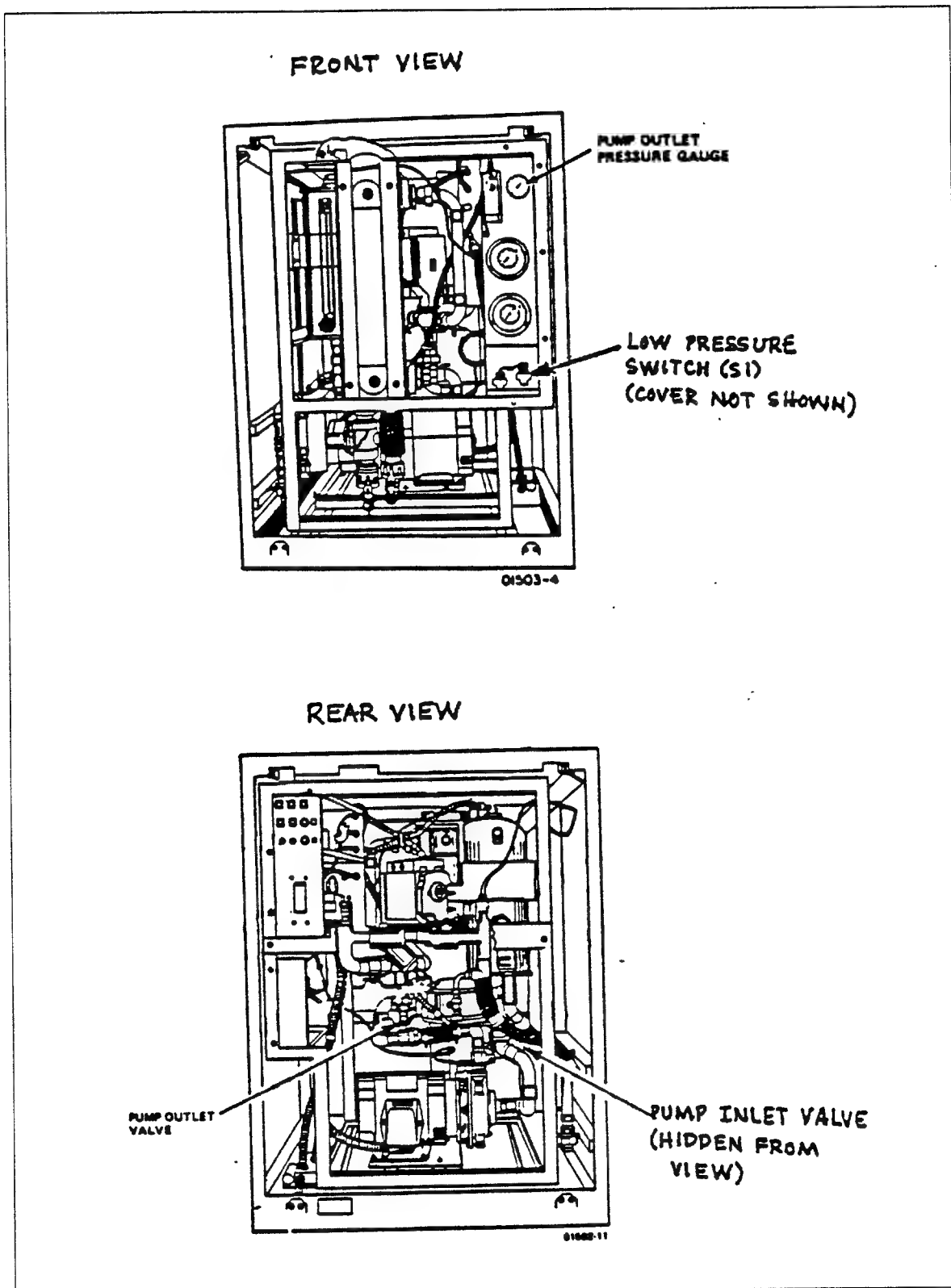


Figure 5-26. GH251-C Low Pressure Switch Adjustment

Make
H2
(hdg.)
→

GH251-C WCU High Pressure Switch Adjustment

Use this procedure to adjust the high pressure switch (S2). Refer to figure 5-27.

Procedure Prerequisites

- Water cooling unit is operating and all other Prepare Water Cooling Unit procedures have been completed.

Tools/Parts required

- Slotted screw driver
- Phillips screwdriver
- Digital multimeter, John Fluke model 8020A or equivalent

Procedure

1. Remove front cover from water cooling unit.
2. Remove top screws and loosen bottom screws in switch-box cover of pressure control assembly and remove cover.
3. Use a slotted screwdriver to turn screw on S2 CW approximately two turns.
4. Attach leads of a voltmeter with alligator clips to red and yellow terminals of switch S2. Voltmeter will indicate 22 volts (switch is open).
5. Slowly close pump outlet valve completely and allow pressure to stabilize.
6. Note reading of PUMP OUTLET PRESSURE gauge.
7. Slowly open pump outlet valve until reading of PUMP OUTLET PRESSURE gauge reads 28 kPa (4 psi) less than reading in step 6.
8. Use a slotted screwdriver to turn screw slowly CCW until voltmeter reading goes to zero V (switch closes and produces an audible click). HIGH WATER PRESS indicator lights and pump stops eight seconds later.
9. Fully open pump outlet valve.

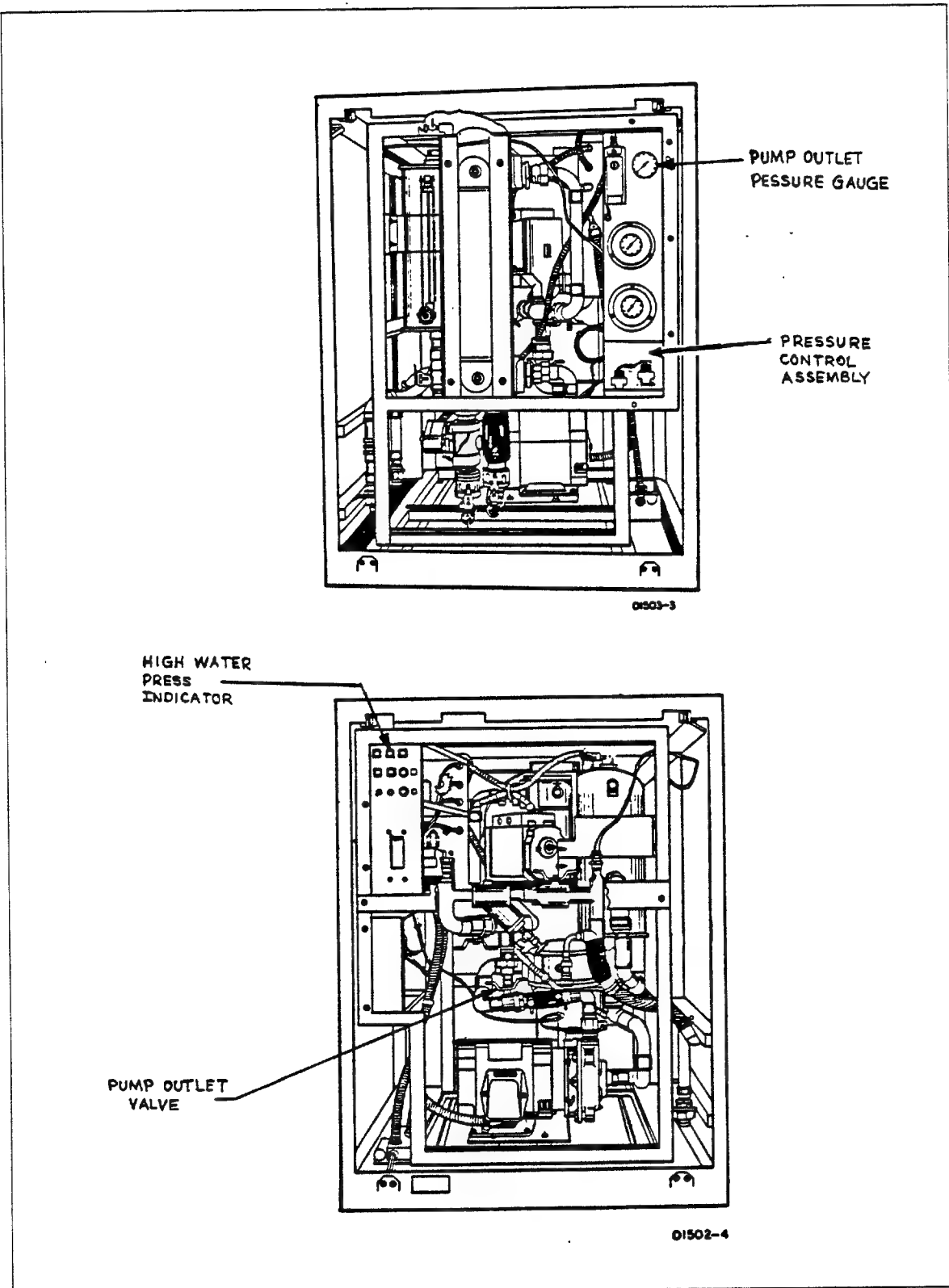


Figure 5-27. GH251-C High Pressure Switch Adjustment

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Final Procedures

Final procedures to be performed on either the water cooling unit or water flow procedures in general consist of the following tasks:

- Check Site Water Flow Rates
- Bleed Air From CP
- Bleed Air From IOU
- Recheck Water Flow Rates
- Connect SPM Cables

Check Site Water Flow Rates

Use the following procedure to verify the correct water flow rates in the site supply lines to the water cooling unit. Refer to figures 5-28 through 5-32.

Tools/parts required

- Differential pressure gauge
- 1/2-in wrench
- Water container, 2 L (1/2 gal)

Procedure

- ___ 1. Prepare differential pressure gauge for checking site flow rate as follows:
 - ___ a. Place differential pressure gauge with dial face vertical.
 - ___ b. Open high- and low-pressure vent valves. If gauge needle does not indicate 0, mechanically set gauge needle as follows:
 - ___ 1) Remove three screws from gauge cover, using a slotted screwdriver.
 - ___ 2) Remove gauge cover and glass assembly.
 - ___ 3) Hold zero adjustment screw in center of pointer with slotted screwdriver while turning pointer to 0 on gauge dial.
 - ___ 4) Replace cover, glass assembly, and mounting screws.
 - ___ c. Close high- and low-pressure vent valves.
 - ___ d. Open bypass valve by turning it counterclockwise.
 - ___ e. Close high- and low-pressure block valves by turning them clockwise.
 - ___ f. Attach hoses provided with differential pressure gauge to high- and low-pressure hose taps on gauge. Tighten hoses with 1/2-in wrench.
- ___ 2. Check site water flow rate as follows:
 - ___ a. Access the venturi flow meter which is located on the site water supply line under the floor tiles. This flow meter requires removal of a protective cover.

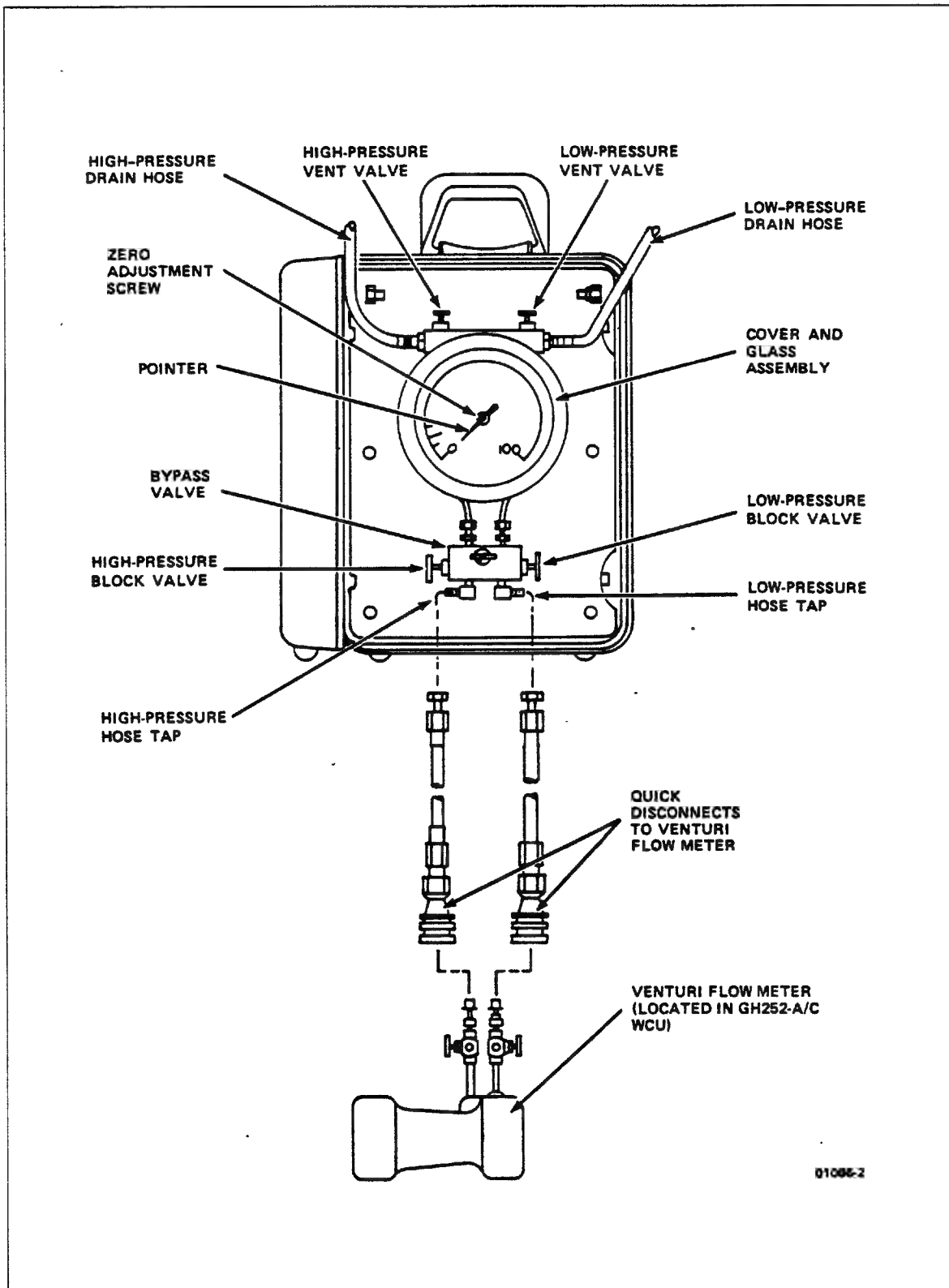


Figure 5-28. Differential Pressure Gauge

- ___ b. Ensure that venturi valves are closed (turned clockwise).

CAUTION

Hoses must be correctly connected between differential pressure gauge and venturi flow meter to prevent damage to gauge.

- ___ c. Connect hoses on differential pressure gauge to quick disconnects on venturi flow meter according to color coding on hoses and venturi flow meter.
 - ___ d. Open valves on venturi flow meter so that water flows into differential pressure gauge.
 - ___ e. Place high- and low-pressure drain hoses in water container.
 - ___ f. Open high- and low-pressure block valves on differential pressure gauge.
 - ___ g. Partially open high- and low-pressure vent valves until draining water no longer contains air bubbles.
 - ___ h. Close high- and low-pressure vent and block valves; leave bypass valve open. If pointer indicates 0, continue with procedure. If pointer does not indicate 0, system contains trapped air. Alternately open high- and low-pressure block valves to relieve air and allow pointer to indicate 0.
 - ___ i. Open high- and low-pressure block valves.
 - ___ j. Close bypass valve.
- ___ 3. Read differential pressure gauge. Gauge indicates flow rate in inches of water.
 - ___ 4. Use calibration chart or chart connected to venturi flow meter to convert inches of water to gal/min as follows:
 - ___ a. For the GH251-C WCU, the flow meter markings are 1-1/2" - 563.
 - ___ b. Refer to in OF WATER Δ P column at left of chart, and locate reading taken in step 3.
 - ___ c. Follow across chart to slanted line corresponding to flow meter type. The number directly below this point in bottom row on chart is flow rate in gal/min.

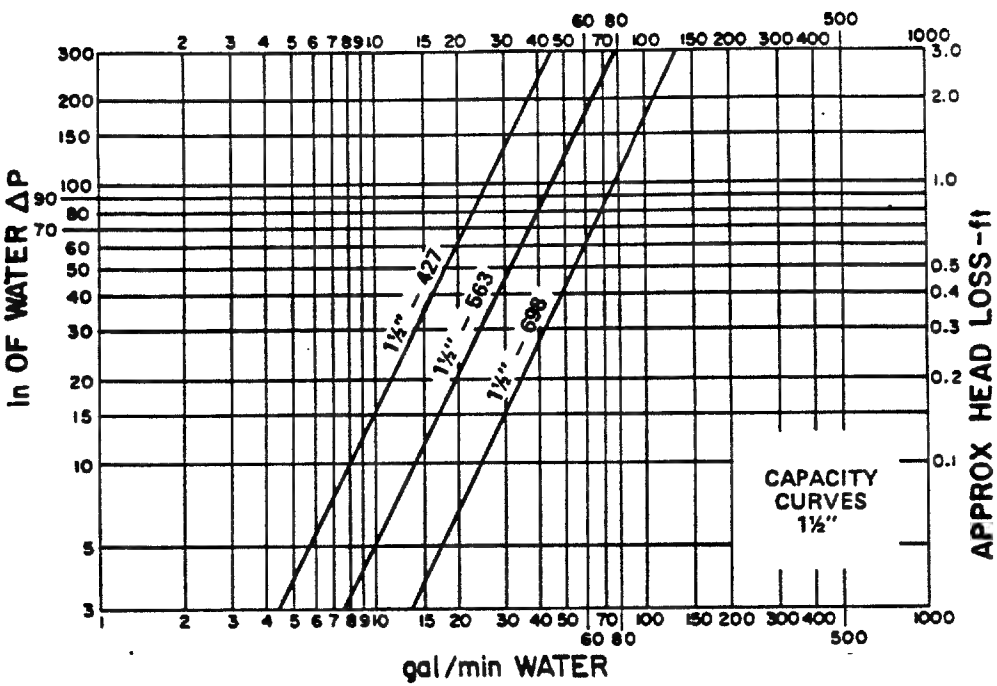


Figure 5-29. Water Flow Calibration Chart

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- 5. Observe reading on CHILLED WATER TEMPERATURE gauge on water cooling unit.
 - 6. Use flow rate (determined in step 4) and chilled water temperature (read in step 5) with appropriate chart to determine whether flow rate is within acceptable limits.
 - 7. Adjust three-way valve on site water supply hose assembly under raised floor, if necessary, to obtain correct flow rate for water temperature.
- If flow rate cannot be properly adjusted, inform customer that site water needs flow/temperature correction.

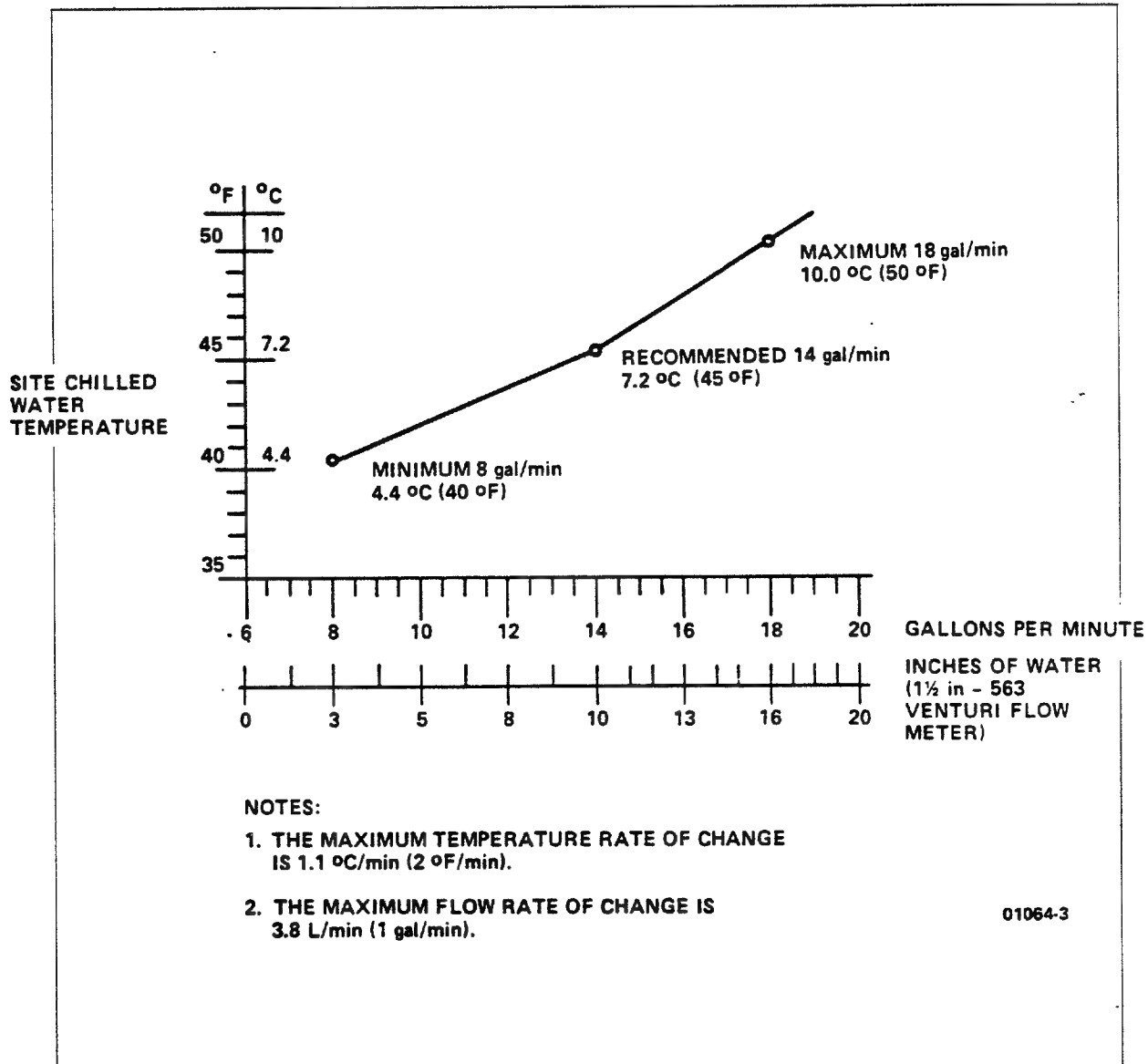


Figure 5-30. Site Water Flow Rate Chart

- 8. Observe water mixing valve indicator on valve linkage housing assembly in water cooling unit. If indicator is not within upper and lower operating limits shown in figure, select following applicable procedure and perform its substeps.
- If position of mixing valve indicator is higher than high limit shown in figure, perform these tasks:
 - a. Decrease site water flow slightly so that mixing valve indicator is positioned midway between OPEN and CLOSED on housing assembly by adjusting three-way valve on SUPPLY hose assembly under raised floor.
 - b. Wait 1/2 hr for water temperature to stabilize. Then observe water temperature gauge on water cooling unit. Adjust temperature control on water cooling unit, if necessary, to maintain a nominal 17.2 °C (63 °F) temperature.

NOTE

Note that a slight opening or closing of water cooling unit chassis bypass valve may help correct mixing valve indicator position. If this adjustment is made, all CP column flow rates must be checked and reset to their original values as follows:

- CP-0 and CP-1 (if present) column 1 flow meters to 11.4 L (3 gal) per min.
 - CP-0 and CP-1 (if present) column 2 flow meters to 11.4 L (3 gal) per min.
 - CP-0 and CP-1 (if present) column 3 flow meters to 15.1 L (4 gal) per min.
 - CM flow meter to 7.6 L (2 gal) per min.
 - IOU NIO cabinet flow meter to 15.1 L (4 gal) per min.
 - IOU CIO cabinet flow meter to 15.1 L (4 gal) per min.
- c. Repeat these adjustments as necessary to position mixing valve indicator correctly.
- If position of mixing valve indicator is lower than low limit shown in figure, perform the following tasks:
 - a. Increase site water flow slightly so that mixing valve indicator is positioned midway between OPEN and CLOSED on housing assembly by adjusting three-way valve on SUPPLY hose assembly under raised floor.

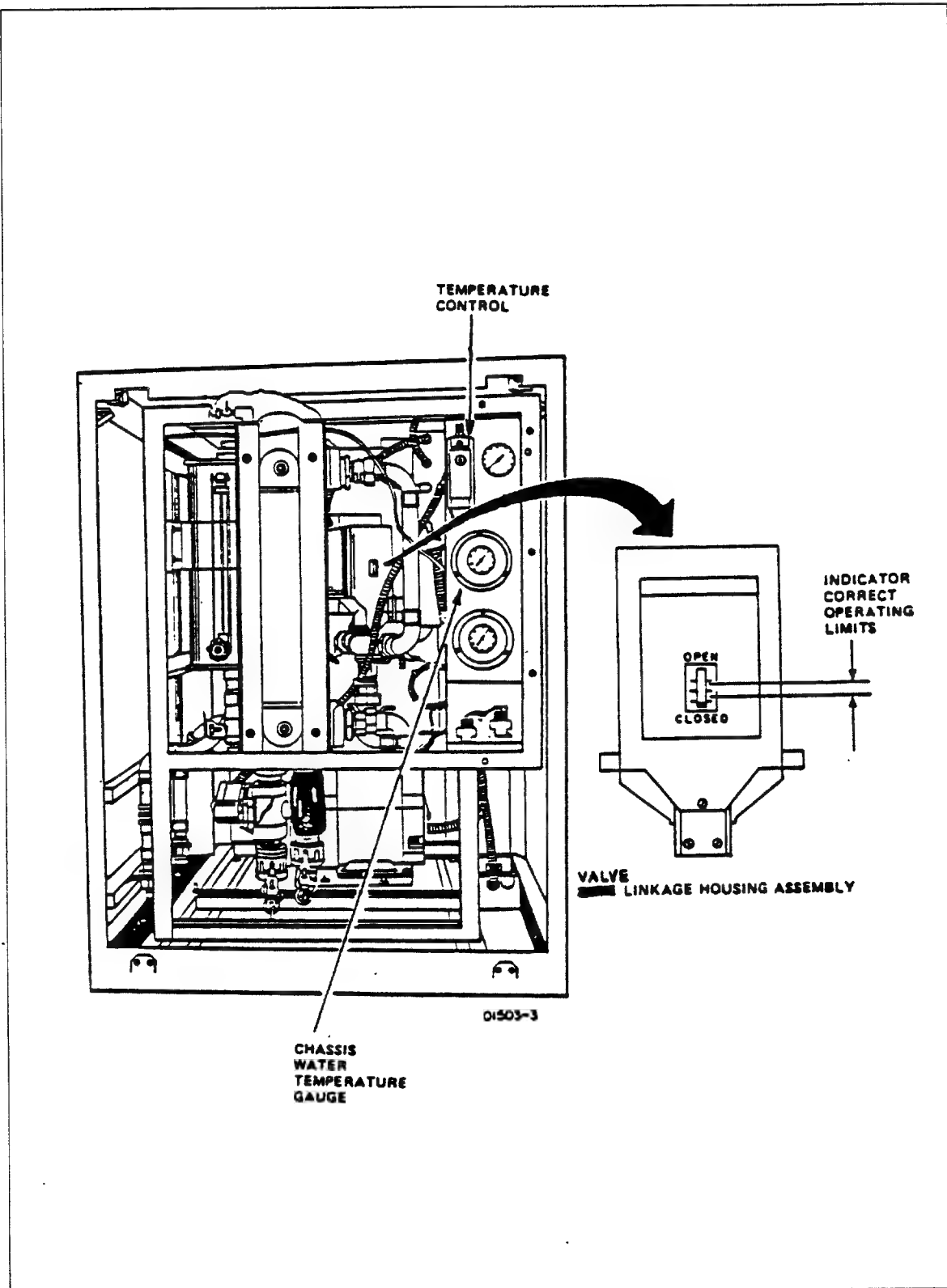


Figure 5-31. GH251-C WCU Mixing Valve Indicator

- b. Wait 1/2 hr for water temperature to stabilize. Then observe water temperature gauge on water cooling unit. Adjust temperature control on water cooling unit, if necessary to maintain a nominal 17.2 °C (63 °F) temperature.

NOTE

Note also that a slight opening or closing of water cooling unit chassis bypass valve may help obtain correct indicator position. If this adjustment is made, all CP column flow rates must be checked and reset to their original values as follows:

-
- CP-0 and CP-1 (if present) column 1 flow meters to 11.4 L (3 gal) per min.
 - CP-0 and CP-1 (if present) column 2 flow meters to 11.4 L (3 gal) per min.
 - CP-0 and CP-1 (if present) column 3 flow meters to 15.1 L (4 gal) per min.
 - CM flow meter to 7.6 L (2 gal) per min.
 - IOU NIO cabinet flow meter to 15.1 L (4 gal) per min.
 - IOU CIO cabinet flow meter to 15.1 L (4 gal) per min.

- c. Repeat these adjustments as necessary to position mixing valve indicator correctly.

- If mixing valve indicator modulates (hunts) outside of limits, perform these tasks:

NOTE

Modulation of mixing valve within limits shown in figure is an acceptable condition.

-
- a. Check customer-supplied site water for following requirements:
 - Maximum temperature rate of change is 1.1 °C/min (2 °F/min), as observed on water cooling unit temperature gauge.
 - Maximum flow rate of change is 3.8 L/min (1 gal/min), as observed on differential pressure gauge.
 - b. If site water does not meet either or both of these conditions, request that customer make corrective adjustments.
 - c. When (and only when) both temperature and flow rates of site water are within requirements, continue with the following steps.

- ___ d. Open or close water cooling unit chassis bypass valve slightly, as required, to stop or limit modulation of mixing valve indicator. Following this adjustment, check all CP column flow rates and reset them to their original values as follows:
 - CP-0 and CP-1 (if present) column 1 flow meters to 11.4 L (3 gal) per min.
 - CP-0 and CP-1 (if present) column 2 flow meters to 11.4 L (3 gal) per min.
 - CP-0 and CP-1 (if present) column 3 flow meters to 15.1 L (4 gal) per min.
 - CM flow meter to 7.6 L (2 gal) per min.
 - IOU NIO cabinet flow meter to 15.1 L (4 gal) per min.
 - IOU CIO cabinet flow meter to 15.1 L (4 gal) per min.
- ___ e. Wait 1/2 hr for water temperature to stabilize. Then observe water temperature gauge on water cooling unit. Adjust temperature control on water cooling unit, if necessary, to maintain a nominal 17.2 °C (63 °F) temperature.
- ___ f. Repeat these adjustments as necessary to position mixing valve indicator correctly.
- ___ 9. Open bypass valve on differential pressure gauge.
- ___ 10. Close venturi flow meter valves, and disconnect differential pressure gauge hoses from flow meter.
- ___ 11. Open high- and low-pressure vent valves on differential pressure gauge.

CAUTION

Drain water from gauge and hoses to prevent damage caused by freezing temperatures that may occur during transporting of gauge.

- ___ 12. Disconnect hoses from differential pressure gauge and venturi flow meter.
 - ___ a. Hold high-pressure hose quick-disconnect end; let nut end dangle into water container.
 - ___ b. Use screwdriver or some other instrument to depress valve in center of quick disconnect to allow water to drain from hose.
 - ___ c. Repeat substeps a and b for low-pressure hose.

- ___ 13. Close bypass valve.
- ___ 14. Place water container under high- and low-pressure hose taps.
- ___ 15. Open high-pressure vent valve.
- ___ 16. Blow into high-pressure drain hose to force water out at low-pressure hose tap.
- ___ 17. Open low-pressure vent valve.
- ___ 18. Blow into low-pressure drain hose to force water out at low-pressure hose tap.
- ___ 19. Repeat this procedure for second water cooling unit, if present for cooling optional CP-1.
- ___ 20. Replace protective cover on venturi flow meter.
- ___ 21. Install floor tiles, if removed.

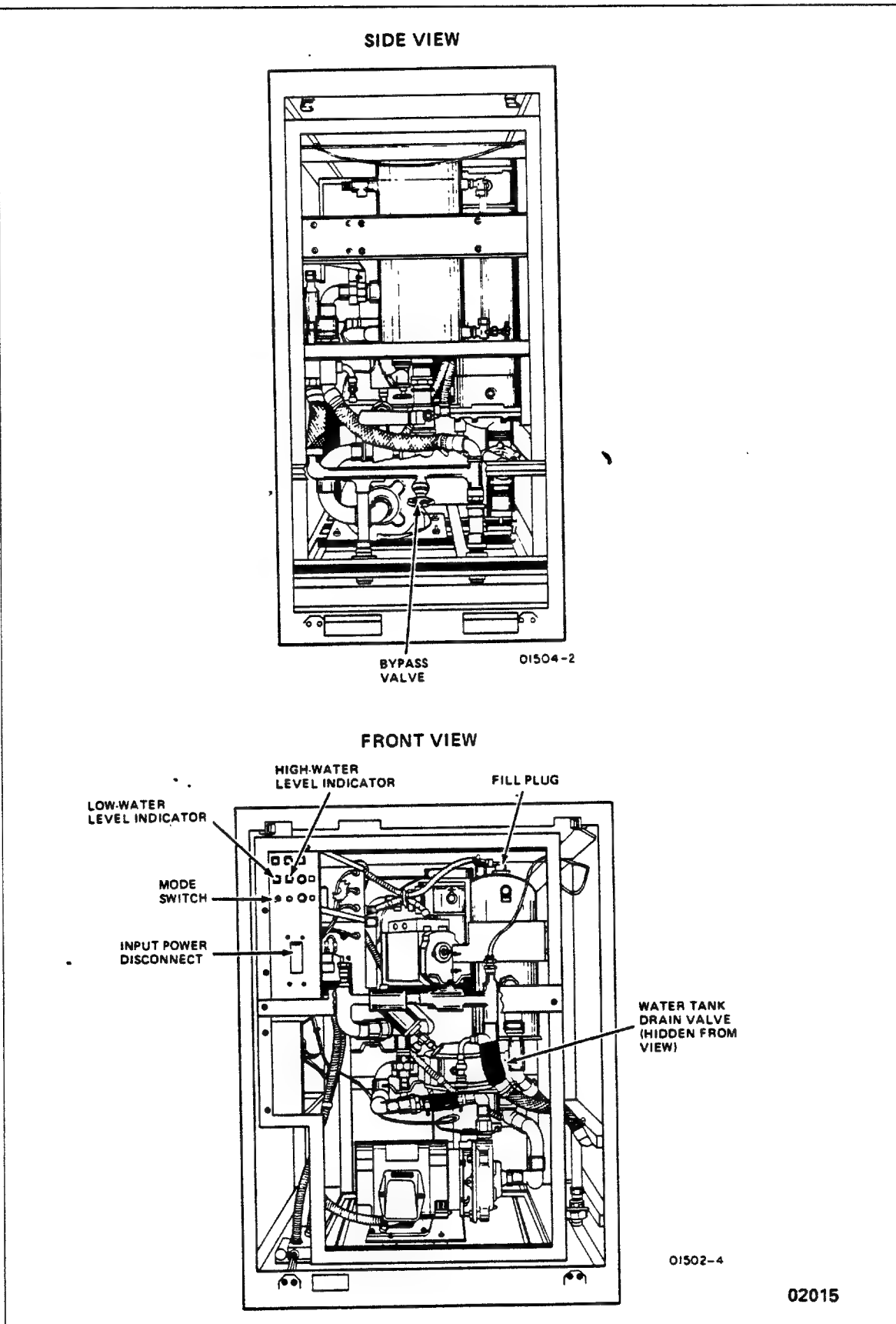


Figure 5-32. GH251-C WCU, Front and Side Views

Bleed Air From CP

Use this procedure to bleed trapped air from the CP-0 and CP-1 (if present) columns. Refer to figure 5-33.

NOTE

DOES A HIGH-TEMPERATURE CONDITION EXIST FOR CP-0 OR CP-1?

- *If yes, continue.*
 - *If no, go to next procedure.*
-

Procedure prerequisites

- The water cooling unit is operating
- Power is applied to CP-0 and CP-1 (if present)

Tools/parts required

- Paper tissues or towel for absorbing water
- Small screwdriver
- Water tank drain hose
- Empty water container to hold 4 L to 7.6 L (1 gal to 2 gal)

Procedure

- ___ 1. Unscrew and remove end cap from bleed valve at top of CP-0 column 1.
- ___ 2. Place a tissue or towel around valve to absorb bleed water in next step.
- ___ 3. Press compressible needle in center of valve (similar to an auto tire air valve) with small tool, such as screwdriver, until air escapes and water bleeds from valve orifice. Release valve.
- ___ 4. Add water to, or drain it from water cooling unit tank if following conditions exist.
 - Water level in sight glass does not indicate three-fourths full.
 - Water pump motor stops operating while bleeding air, and LOW WATER LEVEL indicator on power disconnect box lights.
 - ___ a. Set INPUT POWER DISCONNECT switch on water cooling unit to OFF.
 - ___ b. Add water, and restart pump motor.
 - Water pump motor stops operating, and HIGH WATER LEVEL indicator on power disconnect box lights. If this condition exists, perform the following steps:
 - ___ a. Set INPUT POWER DISCONNECT switch on water cooling unit to OFF.
 - ___ b. Attach drain hose to water tank drain valve, and place hose in empty water container.

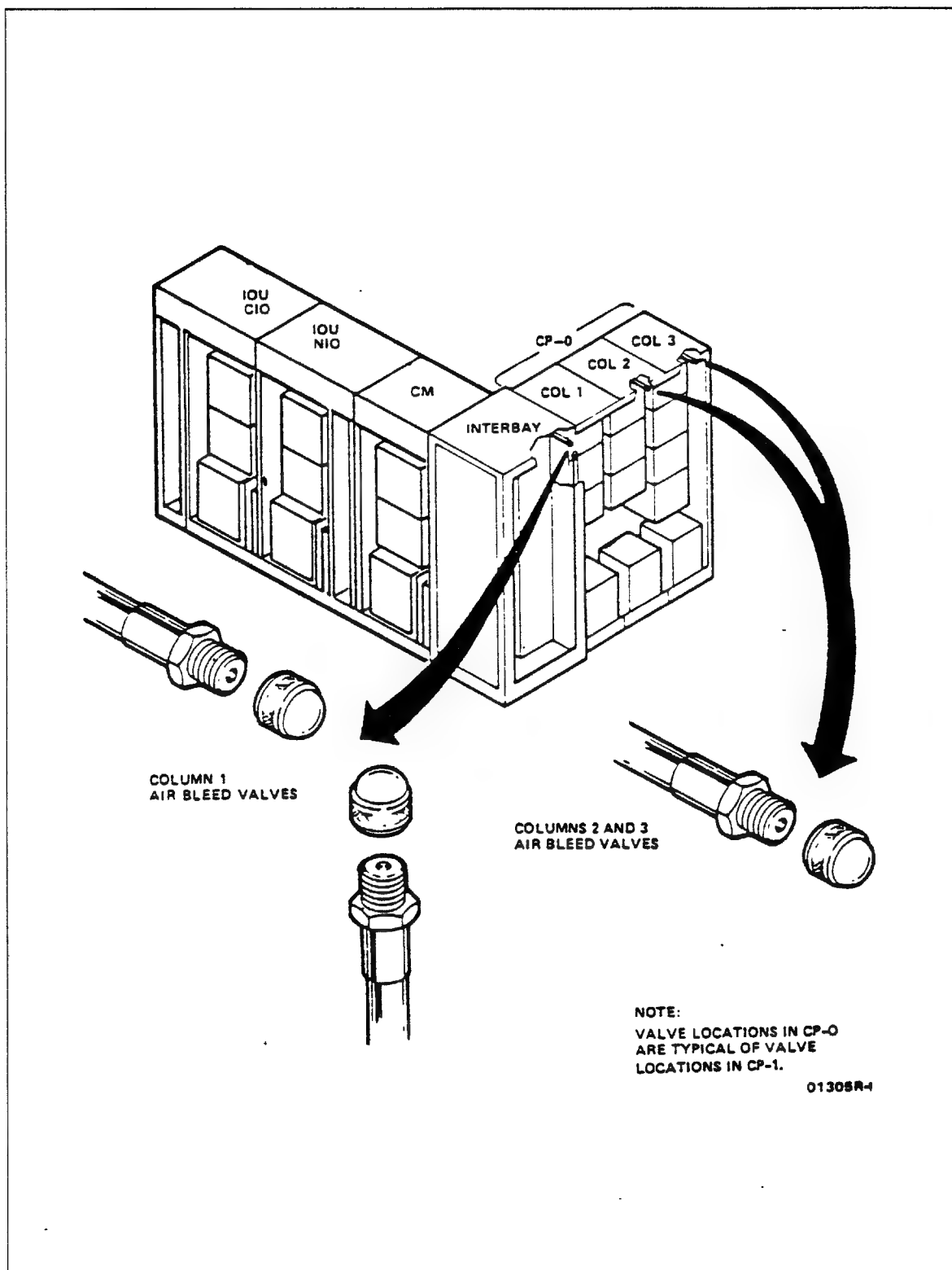


Figure 5-33. CP Columns Air Bleed Valve Locations

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- ___ c. Open water tank drain valve, and drain water into container until sight glass indicates three-fourths full.
- ___ d. Close drain valve. Remove drain hose and container.
- ___ e. Restart pump motor.
- ___ 5. Repeat steps 1 through 4 for CP-0 column 2.
- ___ 6. Repeat steps 1 through 4 for CP-0 column 3.
- ___ 7. Repeat procedure for optional CP-1 (if present).

Bleed Air From IOU

Use this procedure to bleed air from the primary IOU. Refer to figure 5-34.

Procedure prerequisites

- Water cooling unit is operating
- Power is applied to IOU

Tools/parts required

- Paper tissues or towel for absorbing water
- Quick coupler opener, P/N 18789100
- Vinyl hose, 1/2-in diameter

Procedure

- 1. Hold paper tissues or towel under bleed valve in NIO section of IOU.

NOTE

Some units have more than one bleed valve location. See figure. Also, some units may have Schrader bleed valves instead of petcock valves. For those that have Schrader valves, use quick coupler opener and vinyl hose to bleed unit.

- 2. Open valve slowly and allow air to escape. When water begins to escape, shut valve.
- 3. Remove paper tissues or towel.
- 4. Add water, as necessary, to maintain water level at three-fourths full in sight glass.
 - If water pump motor stops operating while bleeding air, and LOW WATER LEVEL indicator on power disconnect box lights:
 - a. Set INPUT POWER DISCONNECT switch on water cooling unit to OFF
 - b. Add water and restart pump motor.
 - If water pump motor stops operating and HIGH WATER LEVEL indicator on power disconnect box lights:
 - a. Set INPUT POWER DISCONNECT switch on water cooling unit to OFF.
 - b. Attach drain hose to water tank drain valve and place hose in empty water container.
 - c. Open water tank drain valve and drain water into container until sight glass indicates three-fourths full.
 - d. Close drain valve.
 - e. Remove drain hose and container.

- ___ f. Restart pump motor.
- ___ 5. Repeat this procedure for optional IOU CIO and CM cabinets.

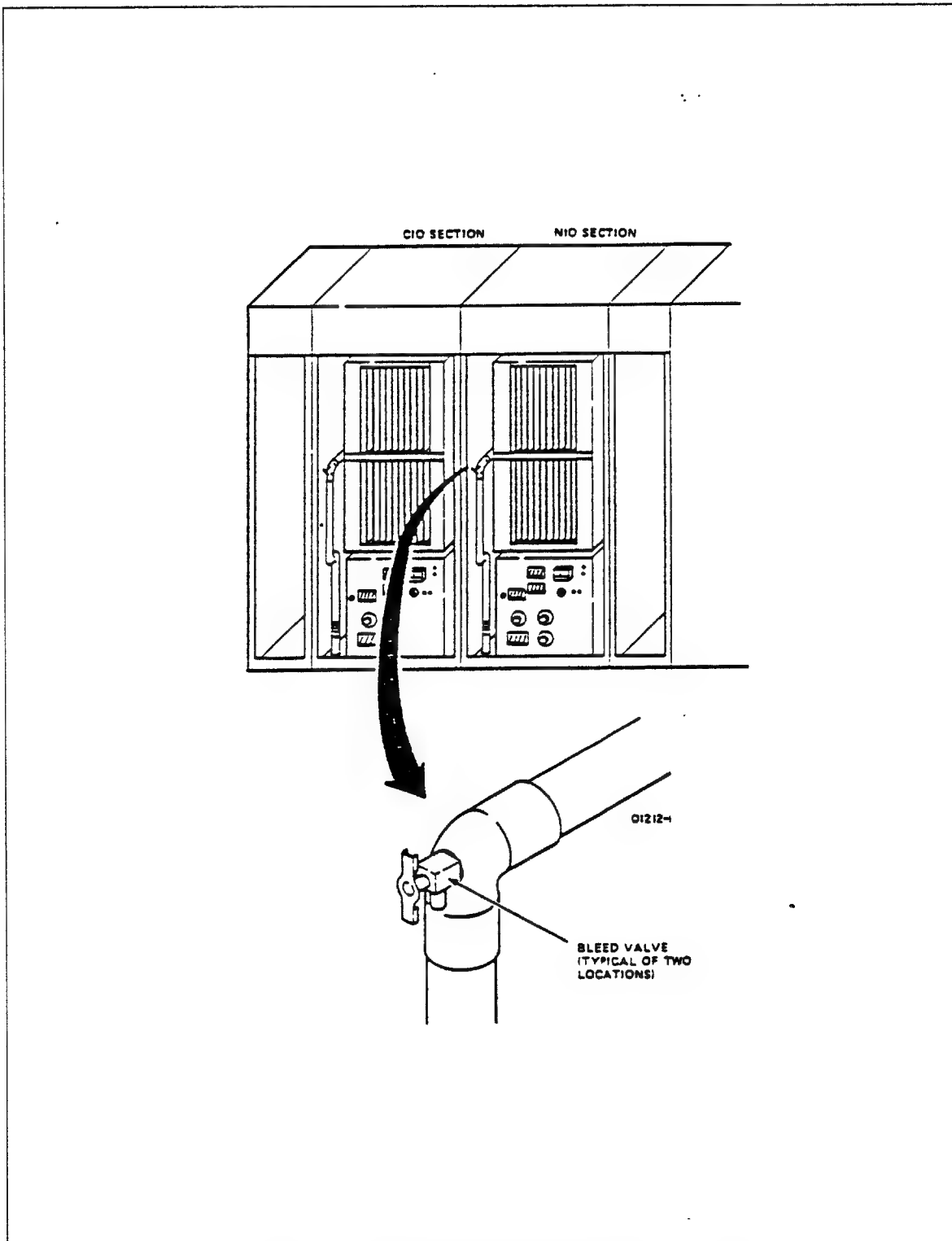


Figure 5-34. IOU ~~and~~ ~~CM~~ Air Bleed Valve Locations

Recheck Water Flow Rates

Use this procedure to recheck the initial settings of the water flow rates through the CM, CP, and IOU columns. This recheck is necessary after stabilization of the water flow through the system. Refer to figure 5-35.

Procedure prerequisites

- All previous procedures in this chapter have been completed and the WCU is operating.

Procedure

- 1. Check the applicable columns to ensure that water flow meters on under-floor water manifolds have following flow rates:
 - a. IOU NIO cabinet, 15.1 L (4 gal) per min.
 - b. IOU CIO cabinet 15.1 L (4 gal) per min.
 - c. CM cabinet, 7.6 L (2 gal) per min.
 - d. CP-0 and CP-1 (if present) column 1 cabinets, 11.4 L (3 gal) per min.
 - e. CP-0 and CP-1 (if present) column 2 cabinets, 11.4 L (3 gal) per min.
 - f. CP-0 and CP-1 (if present) columns 3 cabinets, 15.1 L (4 gal) per min.
 - g. Adjust control valves as necessary to correct water flow rates.
- 2. Install all covers on flow meters.
- 3. Check water cooling unit for following gauge readings:
 - a. PUMP OUTLET PRESSURE gauge
 - For 60-Hz power, 483 to 635 kPa (70 psi to 92 psi).
 - For 50-Hz power, 276 to 414 kPa (40 psi to 60 psi).
 - b. CHASSIS WATER TEMPERATURE gauge has a reading of 16.7°C to 18.3°C (62°F to 65°F).
 - c. CHILLED WATER TEMPERATURE gauge has a reading of 4.4°C to 10.0°C (40°F to 50°F).
- 4. Make any necessary adjustments to obtain correct pressure and temperature. These adjustments are described in an earlier procedure in this chapter, Check Water Cooling Unit Temperature, Pressure, and Flow.

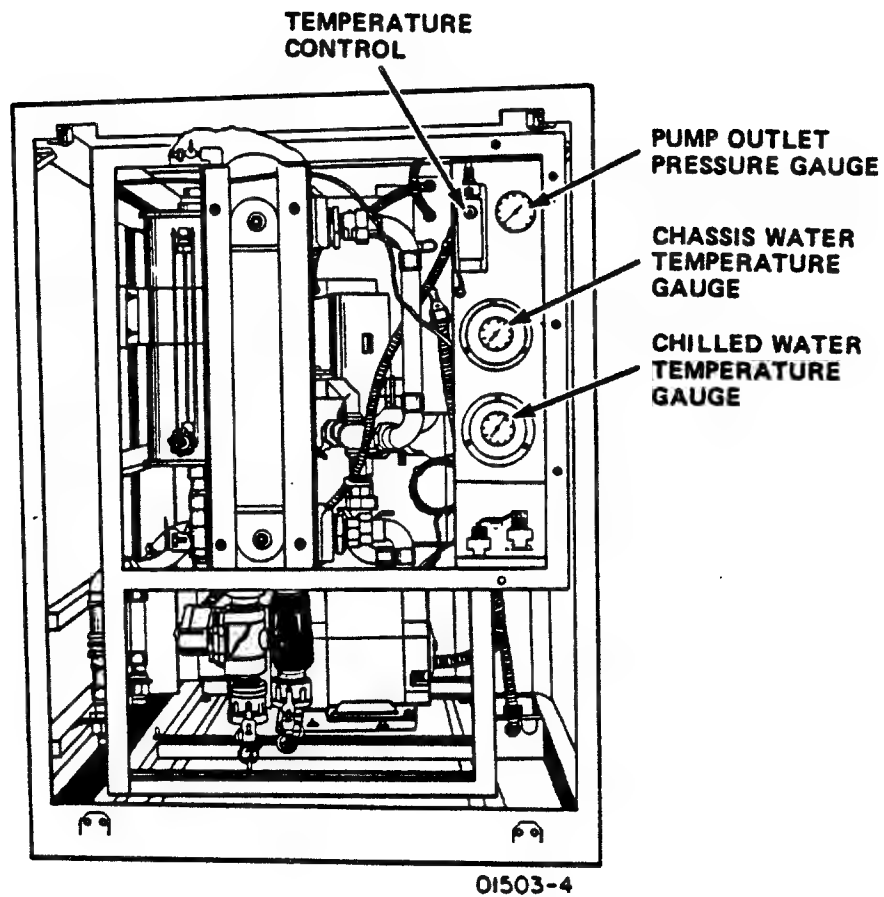


Figure 5-35. GH251-C WCU Temperature and Pressure Gauges

Connect SPM Cables

Use this procedure to connect the status and control cables from the system power monitor (SPM) to the GH251-C WCU. Refer to figure 5-36.

NOTE

DOES SYSTEM USE AN SPM?

- If yes, continue.
 - If no, go to next procedure.
-

Procedure

- ___ 1. Route status and control cables under raised floor between SPM and floor cutouts for water cooling unit.
- ___ 2. Connect status and control cable J3 from SPM to J1 on WCU as follows:
 - ___ a. Remove cover from WCU interface assembly.
 - ___ b. Locate cable under raised floor from SPM J2. Remove floor tiles as necessary to locate cable.
 - ___ c. Pull cable up through cable cutout in floor and into bottom of water cooling unit.
 - ___ d. Connect J2 cable from SPM to J1 in water cooling unit.
 - ___ e. Install cover on interface assembly of water cooling unit.
 - ___ f. Install cover plate on power distribution box, if cover is off.
 - ___ g. Install floor tiles.

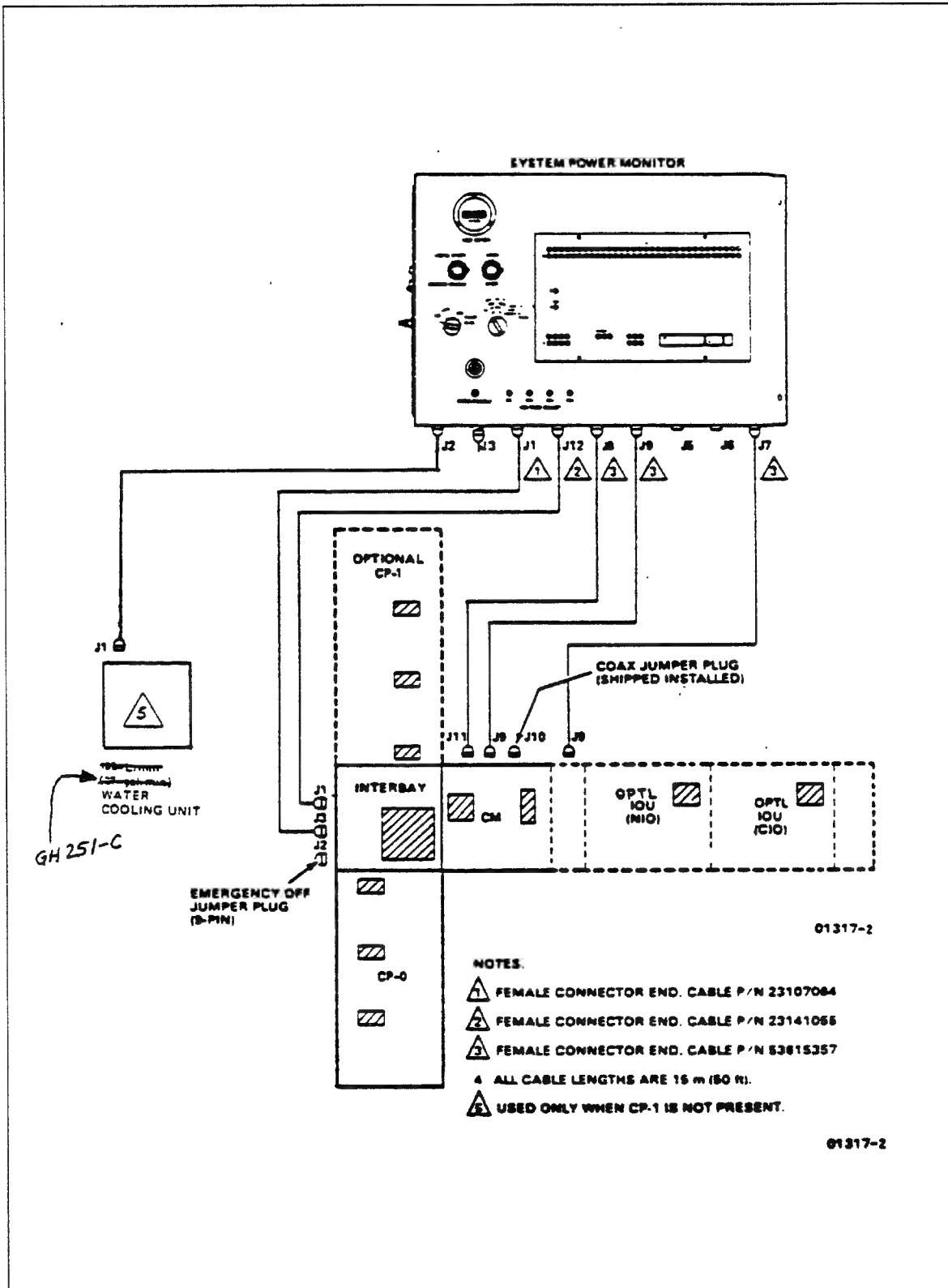


Figure 5-36. SPM Cable Connections to WCU

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GH252-A/-C Water Cooling Unit Installation

6

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GH252-A/-C Water Cooling Unit Installation

6

This section contains procedures for installing and preparing a GH252-A WCU for use. Major topics covered are as follows:

- Preinstallation Procedures
 - Install Site Water Hose Fittings
 - Assemble 4-Port Manifold Assembly
 - Install AT478-A/AT481-A IOU Distilled Water Hoses and WCU Cabinet
 - Install AT478-A/AT481-A IOU Distilled Water Hoses With Existing CP-1
 - Install AT478-A/AT481-A IOU and AD113-A CP-1 Distilled Water Hoses Simultaneously
- Install GH252-A or GH252-C WCU
 - GH252-A/-C Placement and Removal of Shipping Materials
 - Connect Water Hose Assemblies to Water Cooling Unit
 - Connect Water Cooling Unit to Water Manifolds
 - Connect Supply and Return Water Hoses to CP-1
 - Connect Supply and Return Water Hoses to IOU
 - Verify or Change Motor and Transformer Connections in WCU
 - Connect Power to Water Cooling Unit
- Prepare Water Cooling Unit
 - Check Valves on GH252-A/-C, WCUs, CP, CM, and IOU
 - Check Pump Rotation on GH252-A/-C WCUs
 - Fill Water Tank in GH252-A/-C WCUs
 - Check Pump Shaft Alignment on GH252-A WCU
 - Bleed Air From GH252-A/-C WCUs
 - Adjust Water Flow Rates to CP, CM, and IOU
 - Check GH252-A/-C WCU Temperature, Pressure, and Flow
 - GH252-A/-C Low Pressure Switch Adjustment
 - GH252-A/-C High Pressure Switch Adjustment
- Final Procedures
 - Check Site Water Flow Rate
 - Bleed Air from CP
 - Bleed Air From IOU
 - Check Water Flow Rates
 - Connect SPM Cables

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Preinstallation Procedures

Use these procedures to connect site supply and return water hose assemblies to the site supply and return water valves and to place the unconnected hose assembly ends near the floor cutouts for the WCU and the optional equipment.

Preinstallation procedures (as applicable) include the following:

- Install Site Water Hose Fittings
- Assemble 4-Port Manifold Assembly
- Install AT478-A/AT481-A IOU Distilled Water Hoses and WCU Cabinet
- Install AT478-A/AT481-A IOU Distilled Water Hoses With Existing CP-1
- Install AT478-A/AT481-A IOU and AD113-A CP-1 Distilled Water Hoses Simultaneously

Since installations may vary, figures shown in these preinstallation procedures are typical and do not intend to illustrate every conceivable configuration.

NOTE

If your upgrade does not include a GH252-A or GH252-C, go to chapter 5 (GH251-C WCU Installation).

Procedure prerequisites

- Site water supply and water return lines have been flushed free of excessive air bubbles, dirty water and debris.

Tools/parts required

- Diagonal cutter or knife
- Masking tape
- Cable tie identifiers
- Antistatic wrist strap(s)
- For IOU (NIO and CIO):
 - One 3-port water supply manifold
 - One 3-port water return manifold
 - Six 3.2 (10 ft) 0.75-in diameter water hoses (4 for NIO/CIO, 2 for BS213-A CM if installed)
- For CP-1:
 - One 3-port water supply manifold
 - One 3-port water return manifold
 - Six 3.2 m (10 ft) 0.75-in diameter water hoses

Install Site Water Hose Fittings

Use this procedure to install plumbing hardware on site supply and return water assemblies. Refer to figure 6-1.

NOTE

Perform this procedure only if site supply and return hoses are not installed.

Procedure prerequisites

- That site supply and return water lines have been flushed free of dirty water and plumbing debris.

Tools/parts required

- Two quick couplings
- Two close nipples
- Two 24-in pipe wrenches with 3-in jaws
- Teflon tape

Procedure

- ___ 1. Locate two quick couplings.
- ___ 2. Remove warning tags from cams of quick couplings and save them for later replacement.
- ___ 3. Locate two close nipples.
- ___ 4. Wrap two turns of Teflon tape around threads of close nipples in the same direction as travel of threads.
- ___ 5. Screw either end of close nipples into quick couplings.
- ___ 6. Screw unconnected ends of close nipples into site supply and return water valves. Tighten connections using two 24-in pipe wrenches with 3-in jaws. Use one wrench to turn quick disconnect while holding site valve with second wrench.

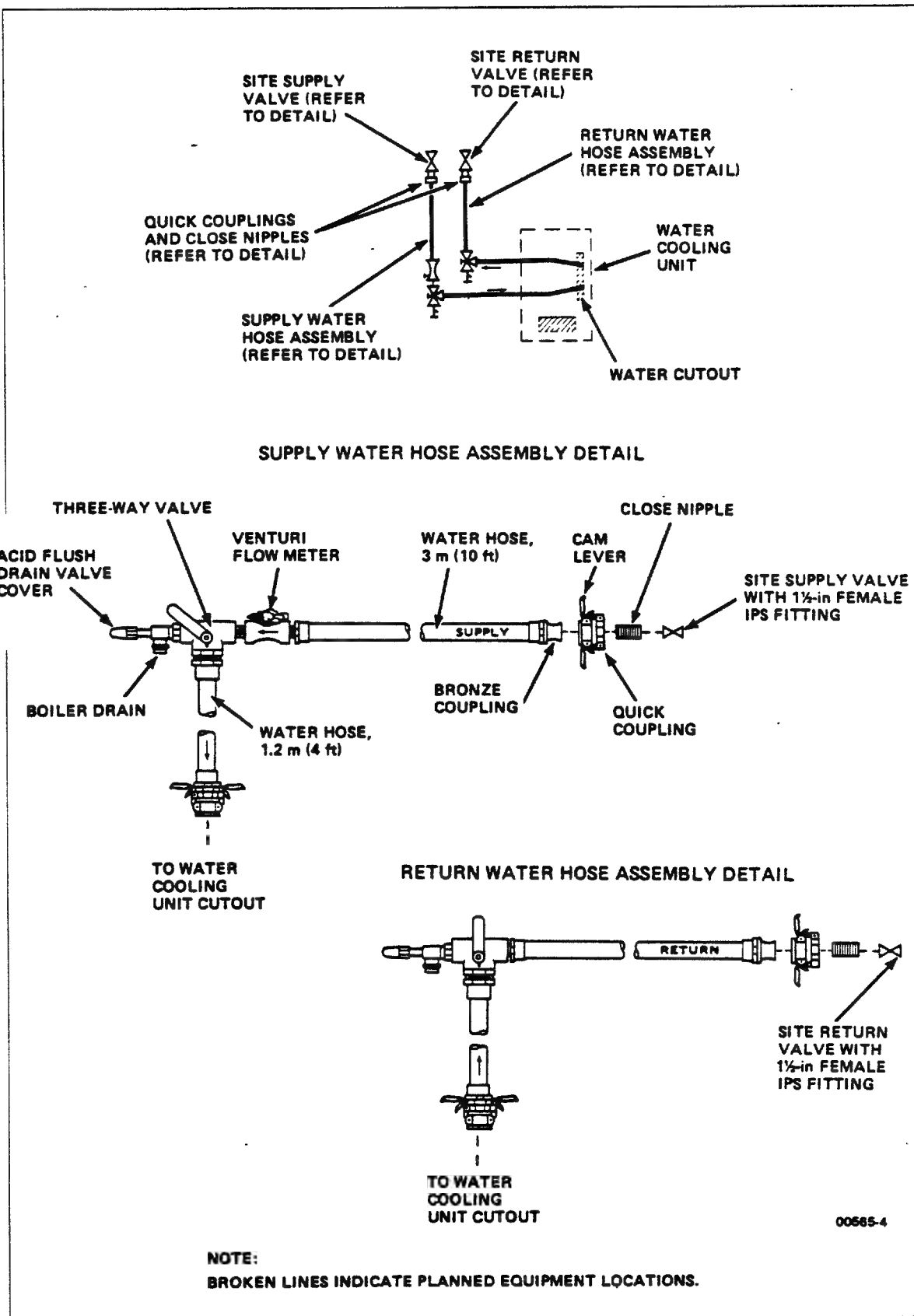


Figure 6-1. Preinstalling Site Water Hoses and Fittings

- ___ 7. Locate the SUPPLY and RETURN water hose assemblies and connect as follows:
 - ___ a. Connect bronze coupling on supply water hose assembly to quick coupling on site supply water valve. Close both sets of cams on quick coupling.
 - ___ b. Insert warning tag wire through holes in both cams of quick coupling and twist lightly.
 - ___ c. Connect bronze coupling on RETURN water hose assembly to quick coupling on site return water valve. Close both sets of cams on quick coupling.
 - ___ d. Secure cams on quick coupling by inserting warning tag wire through holes in both cams and twisting wire ends together tightly.
- ___ 8. Label opposite ends of water hose assemblies SUPPLY and RETURN (if not already labeled).
- ___ 9. Route water hose assemblies to water supply and water return manifolds.

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Assemble 4-Port Manifold Assembly

Use this procedure to assemble a 4-port manifold assembly from a 1- and 3-port manifold assembly. This procedure is performed during preinstallation, before manifold assemblies are placed beneath the raised floor.

The 1- and 2-port manifold assemblies are shipped in separate containers, each marked with the part number # 22697033, and designated 1-of-2 and 2-of-2.

Tools/parts required

- Knife or diagonal pliers
- One 1-port manifold assembly
- One 3-port manifold assembly

Procedure

- ___ 1. Locate 1-port manifold assembly and remove from shipping container.
- ___ 2. Locate 3-port manifold assembly and remove from shipping container.
- ___ 3. Remove 2-in brass end-caps from 3-port manifold assembly and discard.
- ___ 4. Open quick coupling cam levers on 1-port manifold assembly.
- ___ 5. Connect 1- and 3-port manifold assemblies, closing cam levers on quick couplings and installing warning tag wires through holes in levers.
- ___ 6. Set aside assembled 4-port manifold assembly for later placement under raised floor.

Install AT478-A/AT481-A IOU Distilled Water Hoses and WCU Cabinet.

Use this procedure to install hoses and manifolds used with the IOU. Refer to figure 6-2.

NOTE

ARE SITE SUPPLY AND RETURN HOSES IN PLACE FROM PREVIOUS WCU?

- *If yes, continue.*
 - *If no, perform the Install Site Water Hoses procedure, given previously in this chapter. Then, continue with procedure.*
-

Procedure prerequisites

- GH251-A WCU has been removed but hoses and manifolds have been left in place.
- AB115-A IOU has been removed.

Tools/parts required

- Two 3-port supply and return manifolds
- Four 3 m (10 ft) 0.75-in diameter supply and return water hoses

Procedure

- 1. Remove floor tiles, as necessary, to route hoses between locations of IOU NIO, IOU CIO, and WCU cabinets.
- 2. Place 3-port supply and return manifolds used with IOU cabinets in position under raised floor.
- 3. Place four 3 m (10 ft) 0.75-in diameter supply and return hoses under raised floor between IOU cabinets and supply and return manifolds.
- 4. Connect one end of supply and return hoses to ports on supply and return manifolds.
- 5. Place two 9.1 m (30 ft) 1-in diameter water hoses under raised floor between the 4-port and 3-port manifolds.
- 6. Connect the two 9.1 m (30 ft) hoses between the in-line ports on the 3-port and 4-port manifolds.
- 7. Connect two 2.4 m (8 ft) 2-in diameter hoses between 4-port manifold in-line ports and WCU.
- 8. Go to AT478-A/AT481-A IOU Installation (chapter 2).

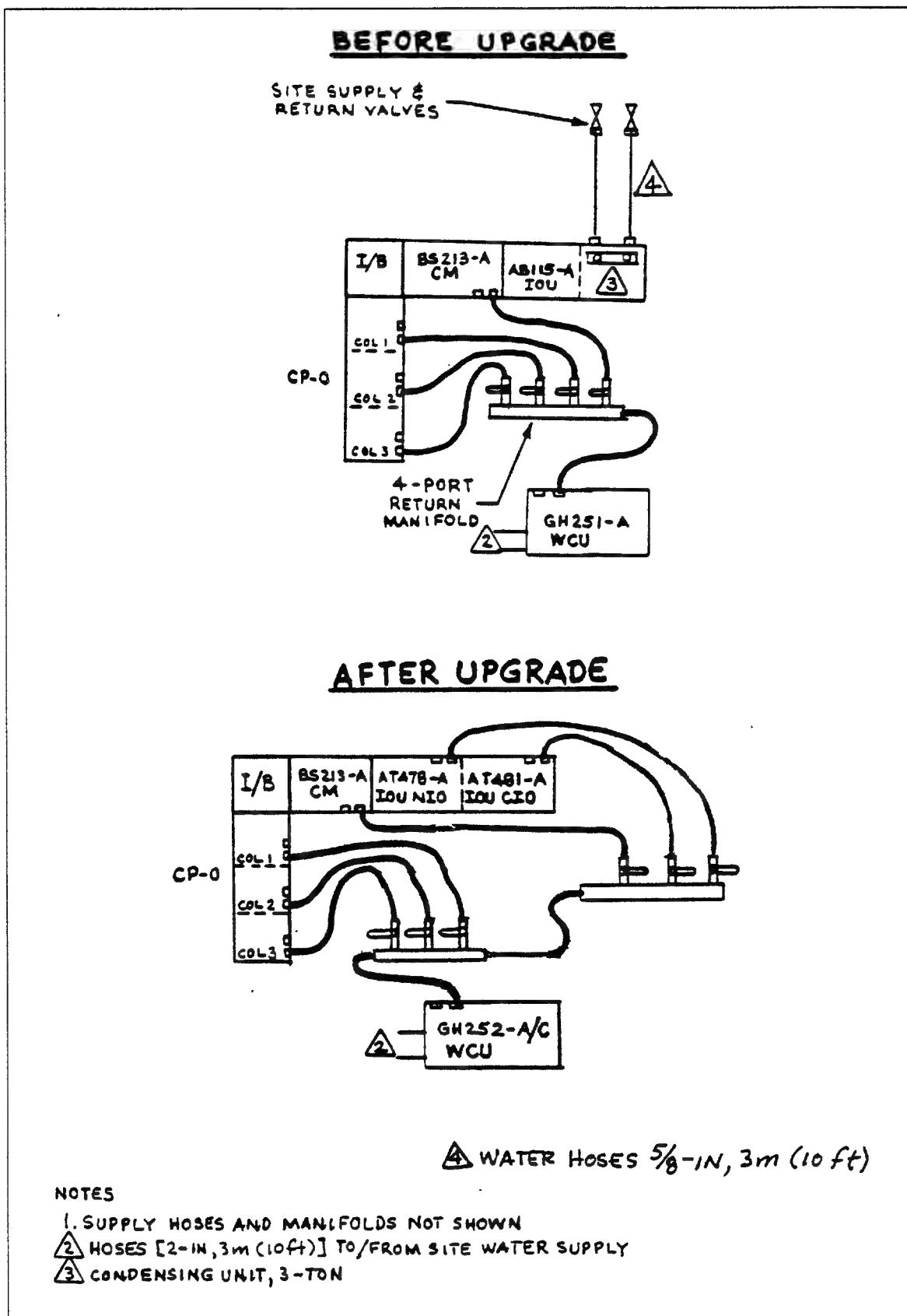


Figure 6-2. Installing IOU on Single-CP 860 Systems

Install AT478-A/AT481-A IOU Distilled Water Hoses With Existing CP-1

Use this procedure to install the hoses and manifolds when adding an IOU NIO and CIO and a WCU to a system that already has CP-1 installed. Refer to figure 6-3.

Procedure prerequisites

- GH251-A and/or GH251-C have both been removed but hoses and manifolds have been left in place.
- AB115-A IOU has been removed

Tools/parts required

- Two 5-port supply and return manifolds
- Two 3-m (10 ft) 1-in diameter water hoses
- Two 9.1 m (30 ft) 1-in diameter water hoses

Procedure

- 1. Remove floor tiles, as necessary, to route hoses between locations of IOU NIO, IOU CIO, and WCU cabinets.
- 2. Place 3-port supply and return manifolds used with IOU cabinets in position under raised floor.
- 3. Place four 3 m (10 ft) 0.75-in diameter water hoses under raised floor between IOU NIO and CIO cabinets and supply and return manifolds.
- 4. Connect one end of water hoses to ports on supply and return manifolds.
- 5. Locate hoses between BS213-A CM and 4-port manifolds. Disconnect hoses from 4-port manifolds and reroute and connect hoses to new 3-port manifolds.
- 6. Place 5-port distributing manifolds under raised floor for use between GH252-A WCU and existing 3- or 4-port manifolds.
- 7. Place two 9.1 m (30 ft) 1-in diameter water hoses under raised floor between 5-port and 3-port manifolds serving the IOU cabinets.
- 8. Connect hoses to in-line ports on 5-port and 3-port manifolds placed in step 7.
- 9. Place two 3 m (10 ft) 1-in diameter hoses under raised floor between 5-port manifolds and WCU location.
- 10. Connect hoses to 5-port manifolds.
- 11. Go to AT478-A/AT481-A IOU Installation (chapter 2).

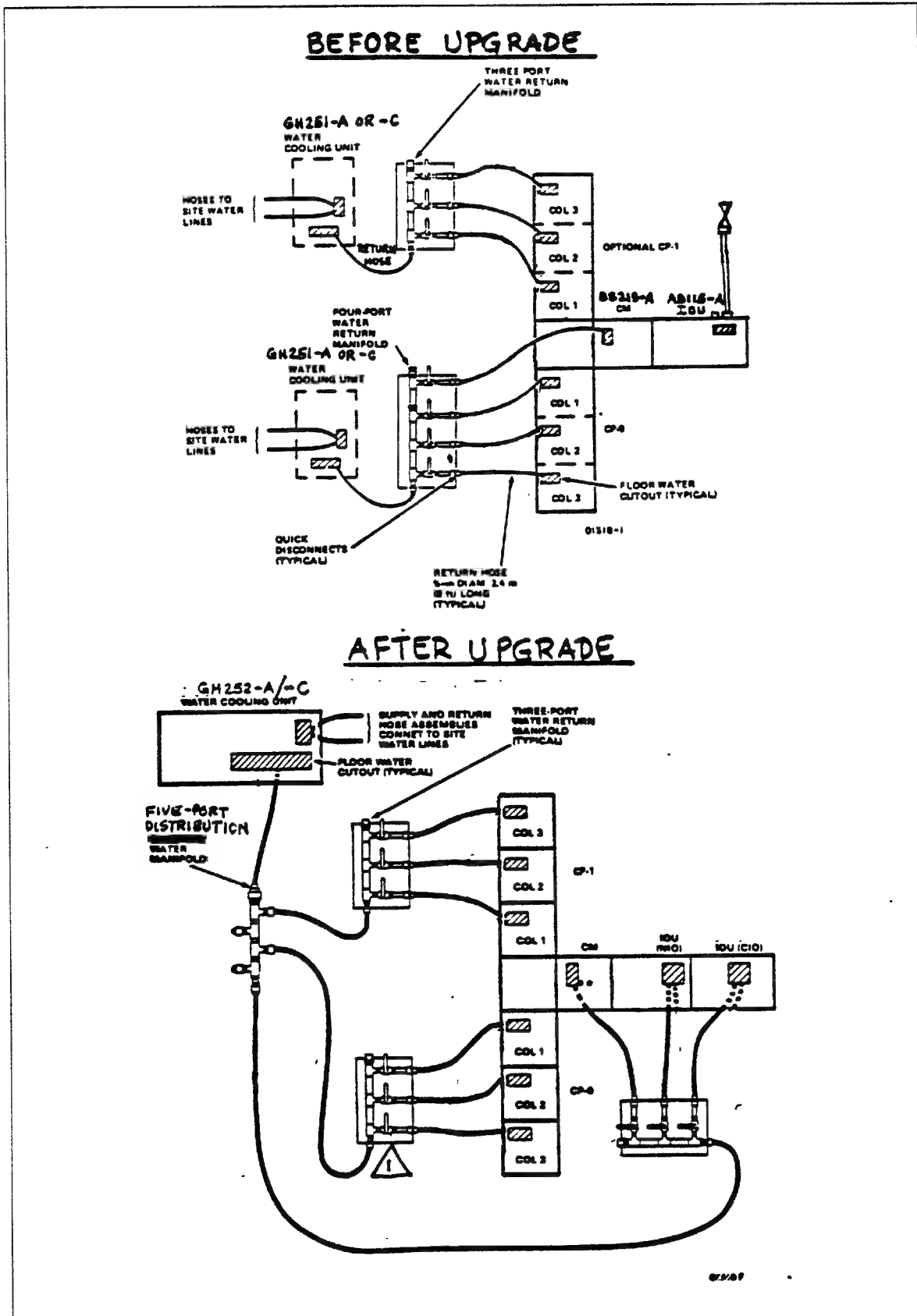


Figure 6-3. Installing IOU and GH252-A WCU on Dual-CP 860 System

Install AT478-A/AT481-A IOU and AD113-A CP-1 Distilled Water Hoses Simultaneously.

Use this procedure to install hoses and manifolds when adding an IOU NIO and IOU CIO, a second central processor (CP-1) and a GH252-A or GH252-C WCU. Refer to figure 6-4.

Procedure prerequisites

- GH251-A or GH251-C WCU has been removed, but manifolds and hoses have been left in place.
- AB115-A IOU has been removed.

Tools/parts required

- Twelve 3 m (10 ft) 0.75-in diameter water hoses
- Four 3-port manifolds
- Two 9.1 m (30 ft) 1-in. diameter water hoses
- Two 3 m (10 ft) 1-in diameter water hoses

Procedure

- 1. Remove floor tiles, as necessary, to route hoses between locations of IOU NIO, IOU CIO, CP-1, and WCU cabinets.
- 2. Place 3-port supply and return manifolds used with IOU and CP-1 cabinets in position under raised floor.
- 3. Place twelve 3 m (10 ft) 0.75-in diameter water hoses under raised floor between IOU NIO/CIO cabinets and manifolds and between CP-1 cabinets and manifolds.
- 4. Connect one end of supply and return hoses to ports on supply and return manifolds.
- 5. Label opposite ends of water hoses for easier identification later.
- 6. Route unconnected hose ends under floor to approximate locations of new cabinets.
- 7. Place two 5-port distribution manifolds under raised floor for use between WCU and new equipment manifolds.
- 8. Place and route two 9.1 m (30 ft) 1-in diameter water hoses between 5-port manifolds and WCU.
- 9. Connect water hoses to in-line ports on 5-port manifolds. Label opposite ends of hoses for easier identification later when WCU is installed.
- 10. Place and route four 3 m (10 ft) 0.75-in diameter water hoses between 5-port manifolds and 3-port manifolds servicing CP-0 and CP-1.

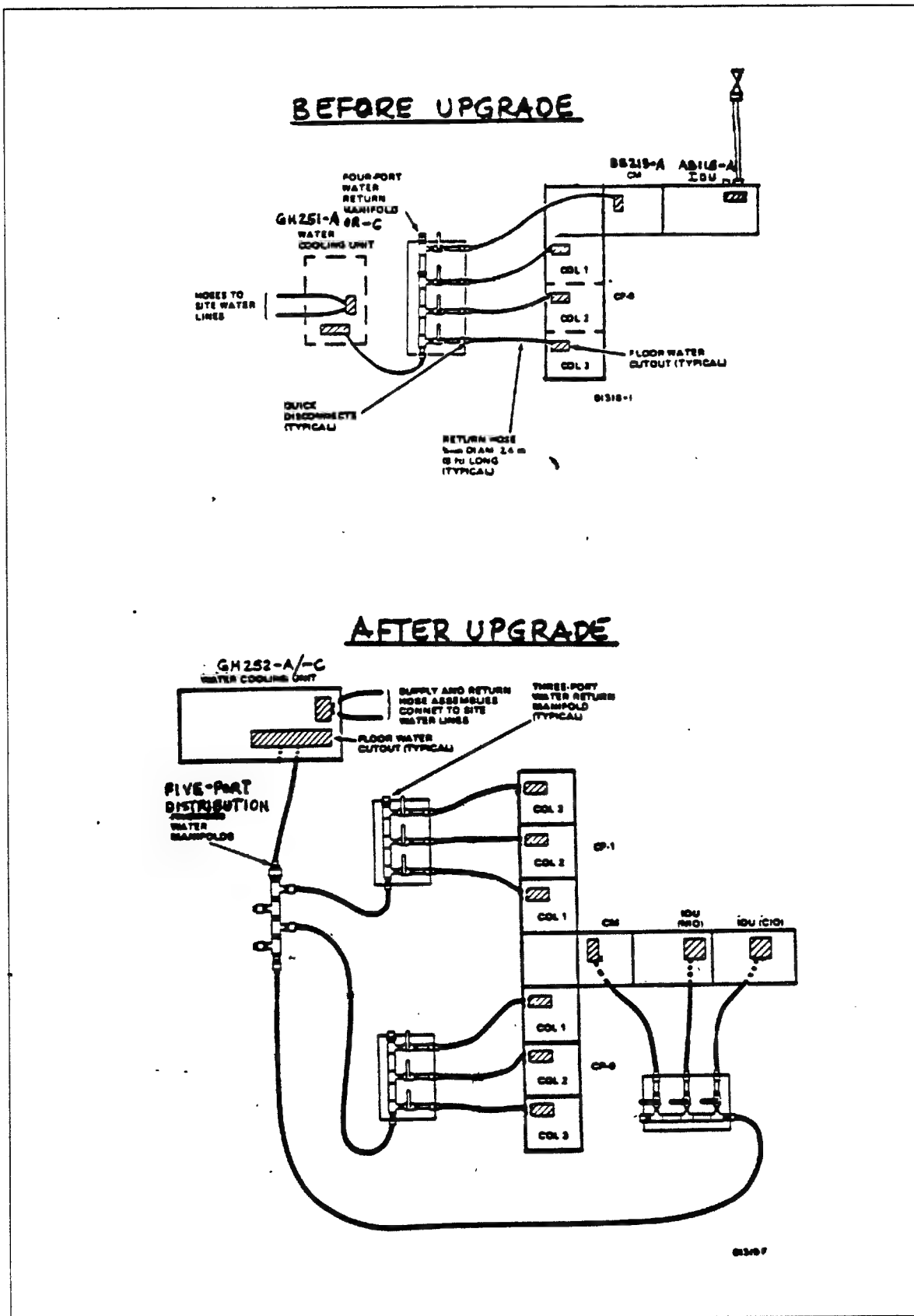


Figure 6-4. Installing IOU, CP-1 and WCU Simultaneously

- 11. Connect water hoses between standard ports of 5-port manifolds and in-line ports of 3-port manifolds.
- 12. Locate water hoses between BS213-A CM and 4-port manifold. Disconnect those hoses from 4-port manifold, and reroute and connect hoses to new 3-port manifolds that service IOU cabinets also.
- 13. Go to AT478-A/AT481-A IOU Installation (chapter 2) and AD113-A CP-1 Installation (chapter 3).

Install GH252-A or GH252-C WCU

Installation of the GH252-A or GH252-C Water Cooling Unit consists of the following tasks:

- GH252-A/-C WCU Placement and Removal of Shipping Materials
- Connect Water Hose Assemblies to Water Cooling Unit
- Connect Water Cooling Unit to Water Manifolds
- Connect Supply and Return Water Hoses to CP-1
- Connect Supply and Return Water Hoses to IOU
- Verify or Change Motor and Transformer Connections in WCU
- Connect Power to Water Cooling Unit

GH252-A/-C WCU Placement and Removal of Shipping Materials

Use this procedure to remove materials installed for shipping purposes in the GH252-A/-C WCU. See figures 6-5 and 6-6.

Procedure prerequisites

- Level floor
- Voltage stated on power label agrees with site wiring.
- Floor cutouts complete for plumbing and electrical access to WCU.

Tools/parts required

- Socket wrench set

Procedure

1. Place pre-cut floor tiles in appropriate location(s) to accommodate WCU.
2. Using Rol-a-lifts move new WCU into position on raised floor.
3. Remove shipping materials from interior of WCU at these locations:
 - Wooden block supporting pump
 - Wooden bracket supporting heat exchanger
 - Metal bracket supporting three-way mixing valve

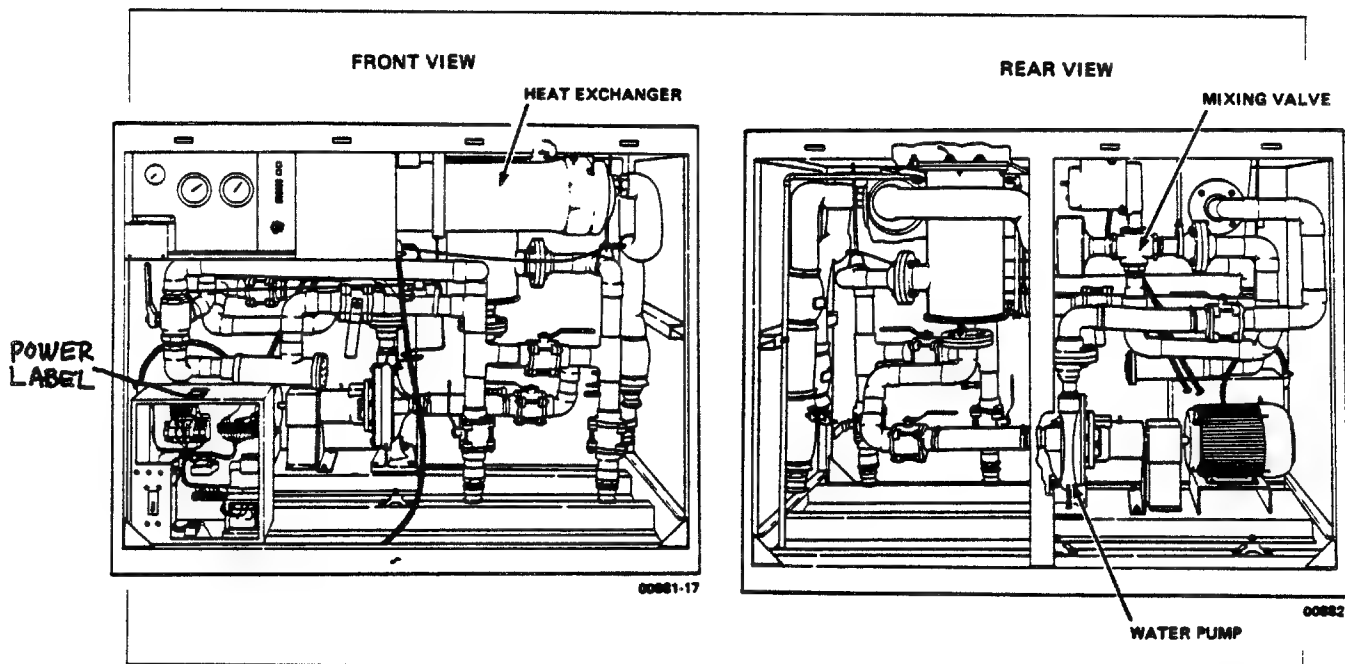


Figure 6-5. GH252-A WCU Component Locations Supported During Shipping

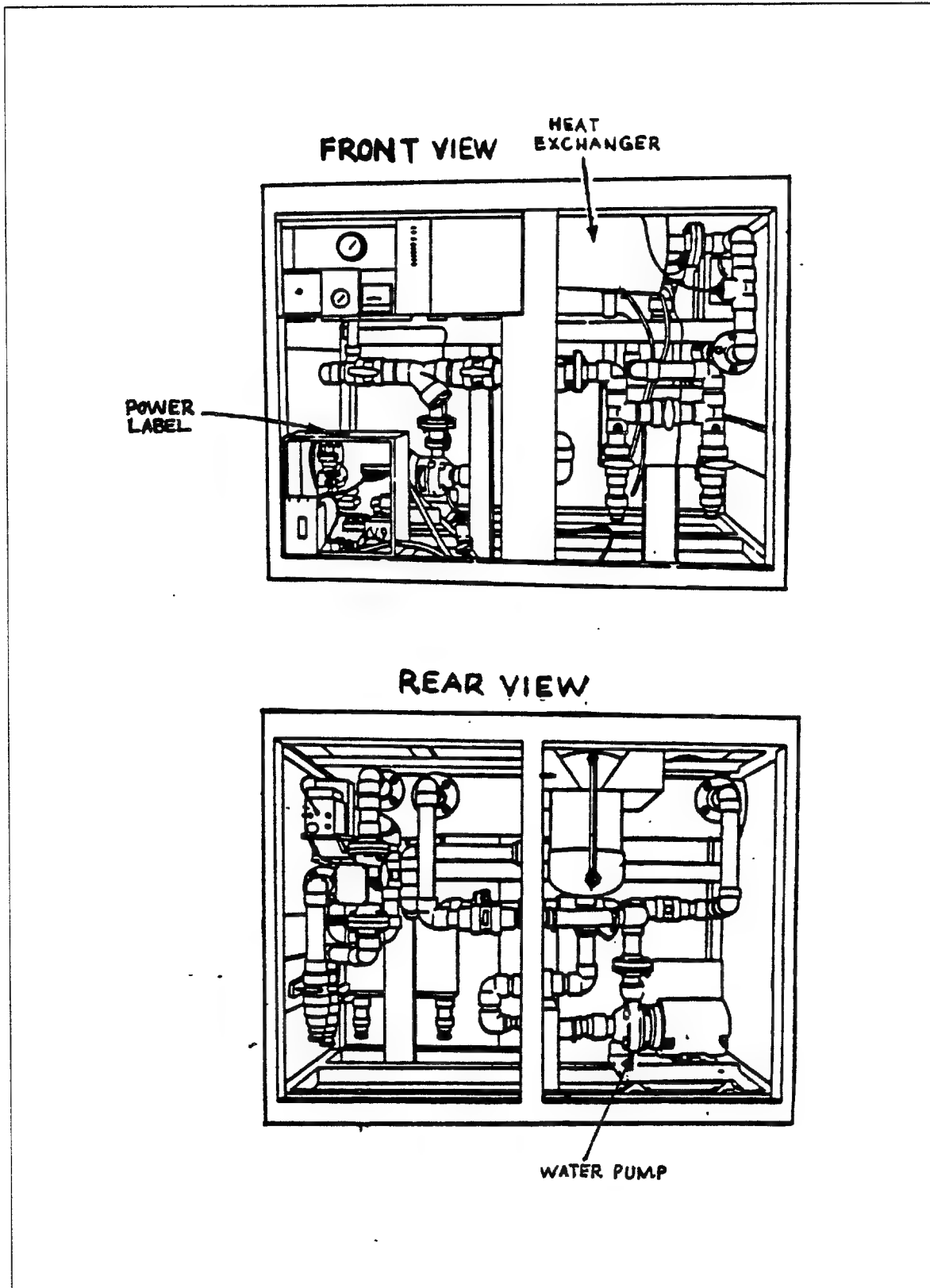


Figure 6-6. GH252-C WCU Component Locations Supported During Shipping

Connect Water Hose Assemblies to Water Cooling Unit

Use this procedure to connect preinstalled site supply and return water hose assemblies to the GH252-A/-C water cooling unit. Refer to figure 6-7.

Procedure prerequisites

- Preinstallation of site supply and return water hose assemblies is complete.

Procedure

- 1. Remove floor tiles, as required, and pull ends of site water hose assemblies up and through water cutout into water cooling unit.
- 2. Remove dust caps from site supply and return quick couplings on water cooling unit. Store dust caps at site.
- 3. Verify that gaskets are present in quick couplings on ends of site supply and return water hoses.

CAUTION

Be sure to connect the supply and return hoses to the corresponding SUPPLY and RETURN connections on the water cooling unit. The water cooling unit does not function properly if these connections are reversed.

After making these hose connections, do not turn water on until instructed to do so. Turning on the water prematurely prevents proper bleeding of air from the site supply and return water lines.

- 4. Identify site supply hose assembly by observing assembly that contains a box-enclosed venturi meter connection.
- 5. Connect site supply and return hoses to respective site SUPPLY and RETURN quick couplings on water cooling unit. Close both cam levers on quick couplings.
- 6. Insert wire of a warning tag, supplied with each coupling, through holes in quick coupling cam levers. Twist wire ends tightly together to ensure that levers are not inadvertently opened.
- 7. Install floor tiles.

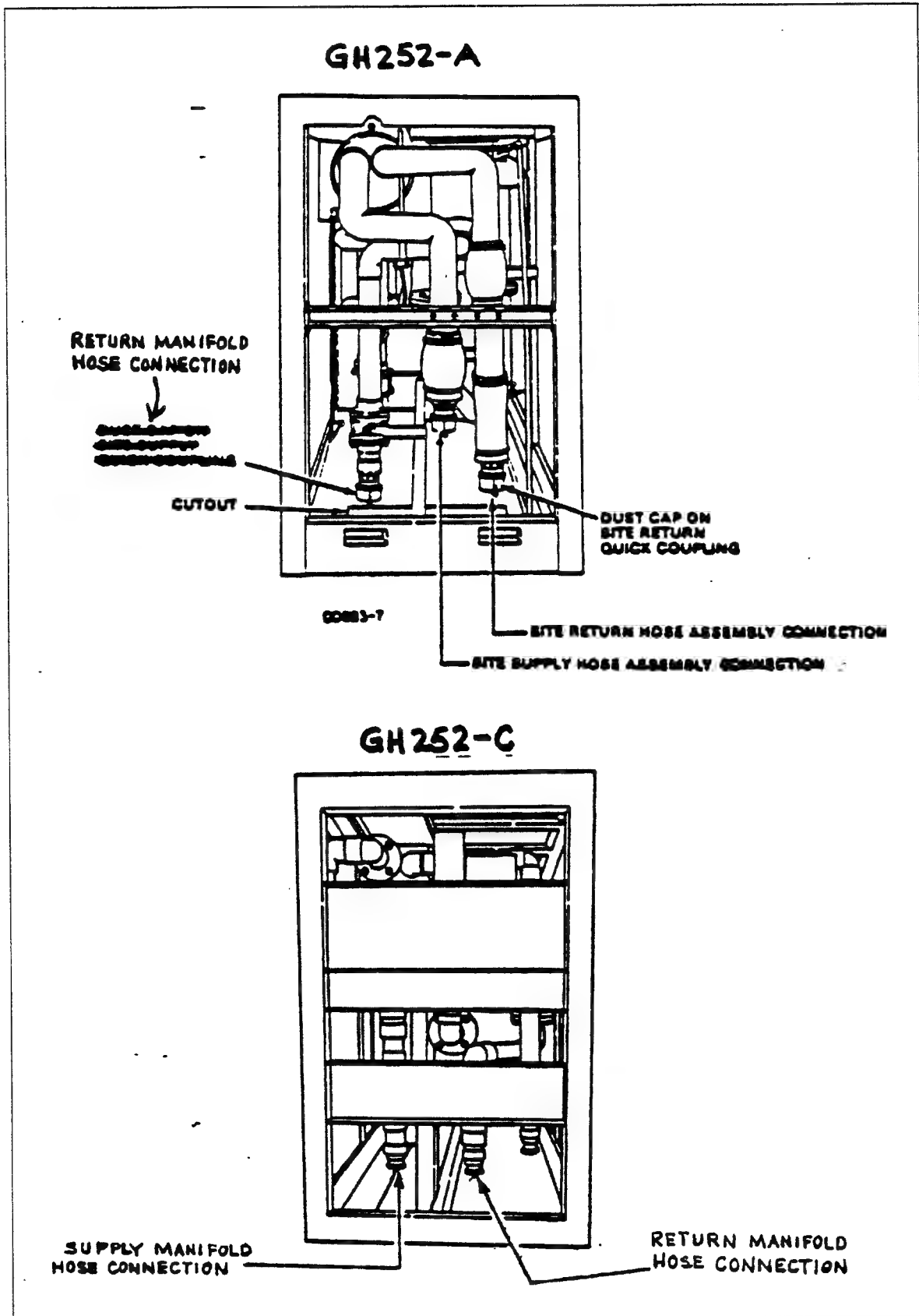


Figure 6-7. Connecting Site Water Hose Assemblies to GH252-A/-C WCUs

Connect Water Cooling Unit to Water Manifolds

Use this procedure to connect preinstalled supply and return hoses on the water supply and return manifolds to the water cooling unit. Refer to figure 6-8.

Procedure prerequisites

- The supply and return water hoses that connect the water cooling unit and the water manifolds were placed under the raised floor and connected to the manifolds during preinstallation.

Procedure

- 1. Remove floor tiles, as required, to pull manifold supply and return water hose ends up through floor and hose cutouts into water cooling unit.
- 2. Remove any dust caps from water cooling unit connections and hose ends. Store dust caps in water cooling unit.
- 3. Verify that gaskets are present in quick couplings on supply and return hoses. (Quick couplings are used only on GH252-A WCU water cooling unit hoses.)

CAUTION

Be sure to connect the supply and return hoses to the corresponding SUPPLY and RETURN connections on the water cooling unit. The water cooling unit does not function properly if these connections are reversed.

- 4. Connect both chassis supply and return hoses to respective SUPPLY and RETURN connections on WCU.
- 5. Close both cam levers on each quick coupling used at water connections.
- 6. Insert warning tag wire, supplied with each coupling, through holes in quick coupling cam levers. Twist wire ends tightly together to ensure that levers do not inadvertently open.
- 7. Replace floor tiles removed in step 1.

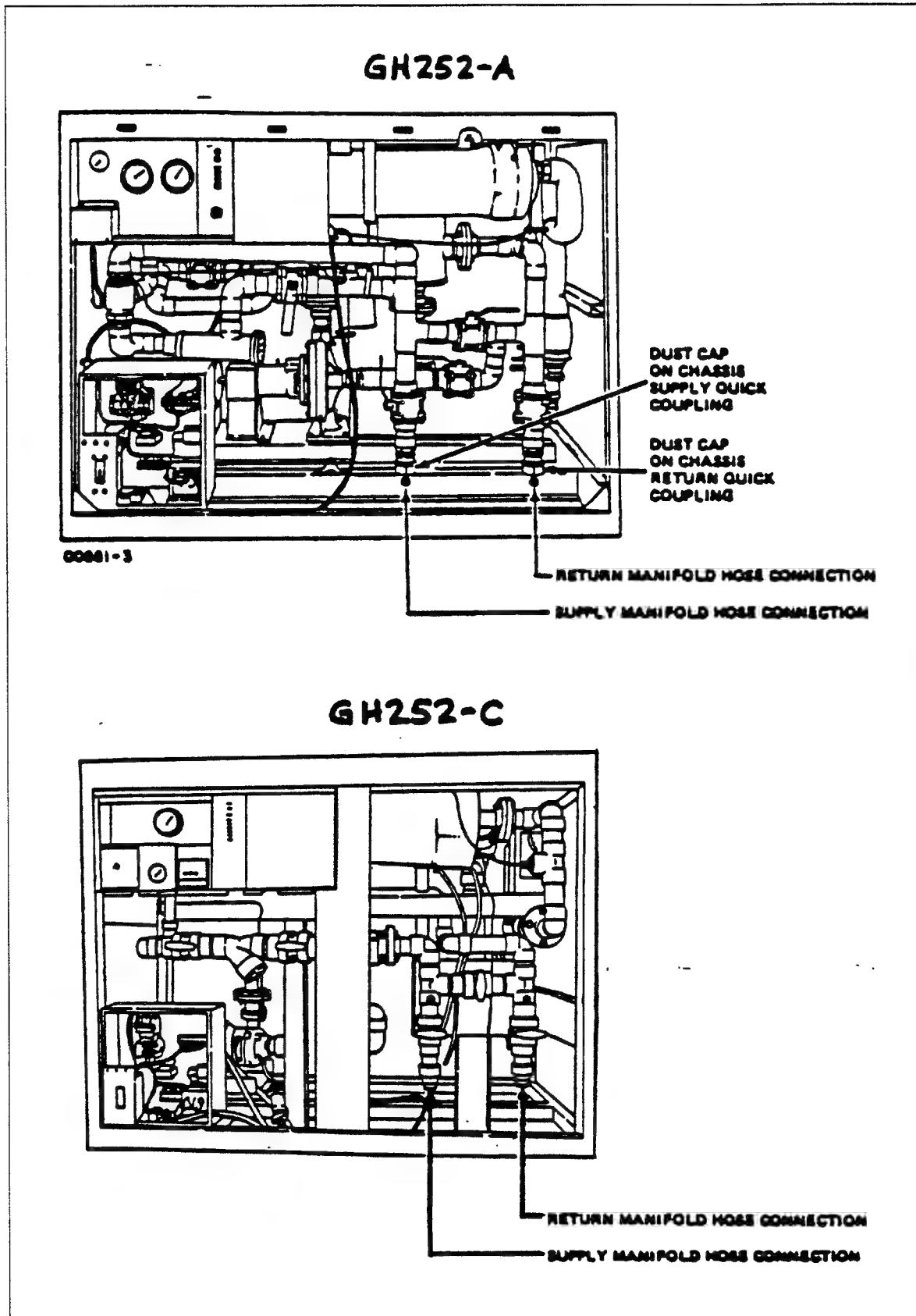


Figure 6-8. Water Manifold Hose Connections to Water Cooling Unit

Connect Supply and Return Water Hoses to CP-1

Use this procedure to connect supply and return water hoses to the columns of CP-1. Refer to figure 6-9.

NOTE

IS CP-1 PRESENT?

- If yes, go to step 1.
 - If no, go to next procedure.
-

Procedure prerequisites

- Supply and return hoses for the CP-1 columns were connected at one end to the water manifolds, placed under the raised floor, and labeled at the other end during preinstallation.

Procedure

- 1. Remove two retaining screws from lower front corners of power distribution box of CP-1 column 1.

CAUTION

Pull power supplies slowly outward from columns while checking that attached rear cables are not damaged by being caught or pinched.

- 2. Slide power distribution box outward from column 3 to gain access to water supply and return connections.
- 3. Remove floor tiles along front of CP-1 cabinet to gain access to hoses from water supply and return manifolds under raised floor.
- 4. Remove protective plugs from hose ends, if required. Store plugs at site.
- 5. Pull unconnected hose ends up through floor and cabinet water cutouts to connections in CP-1 column 3. Use care when pulling hoses.

WARNING

Ensure that supply hose quick disconnect connects to the SUPPLY connection in the CP column and that the return hose quick disconnect connects to the RETURN connection in the CP column. The CP column does not cool properly if these connections are reversed.

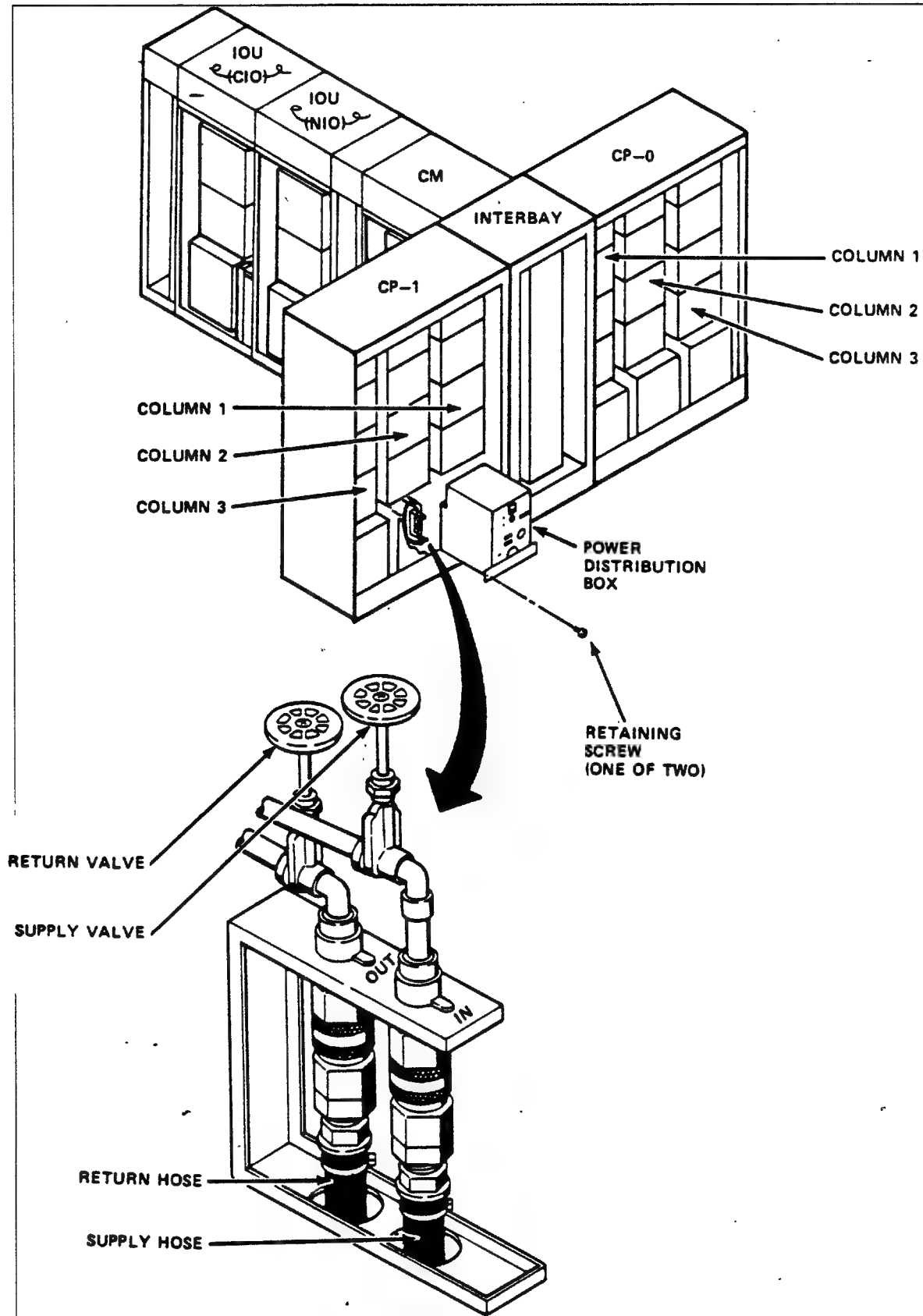


Figure 6-9. Supply and Return Water Hose Connections to CP-1

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- ___ 6. Connect supply and return hoses to supply and return connections in CP-1 column 3.
- ___ 7. Slide power distribution box inward. Do not reinstall retaining screws at this time.
- ___ 8. Repeat steps 1 through 7 for CP column 1.
- ___ 9. Repeat steps 1 through 7 for CP column 2.
- ___ 10. Install floor tiles.

Connect Supply and Return Water Hoses to IOU

Use this procedure to connect supply and return water hoses to the CM, IOU NIO, and IOU CIO cabinets. Refer to figure 6-10.

Procedure prerequisites

- Supply and return hoses for the IOU NIO and CIO cabinets were connected at one end to the water manifolds, placed under the raised floor, and labeled at the other end during preinstallation.

Procedure

1. Remove three retaining screws, lockwashers and cover plate from bottom of IOU NIO cabinet.
2. Remove retaining screw and lockwasher from lower left corner of hinged power distribution box.
3. Open power distribution box to gain access to water supply and return connections.
4. Remove floor tiles, as necessary, in front of IOU NIO cabinet.
5. Remove protective plugs from hose ends, if required. Store plugs at site.
6. Pull unconnected hose ends up through floor and cabinet water cutouts to connections in IOU NIO cabinet.

CAUTION

Ensure that the supply hose quick disconnect connects to the SUPPLY connection in the IOU NIO cabinet and that the return hose quick disconnect connects to the RETURN connection in the IOU NIO cabinet. The IOU NIO cabinet does not cool properly if these connections are reversed.

7. Connect supply and return hoses to supply and return connections in IOU NIO cabinet. Verify that hoses are connected to correct connections.
8. Close power distribution box. Do not reinstall retaining screw or cover plate at this time.
9. Repeat this procedure for IOU CIO cabinet.

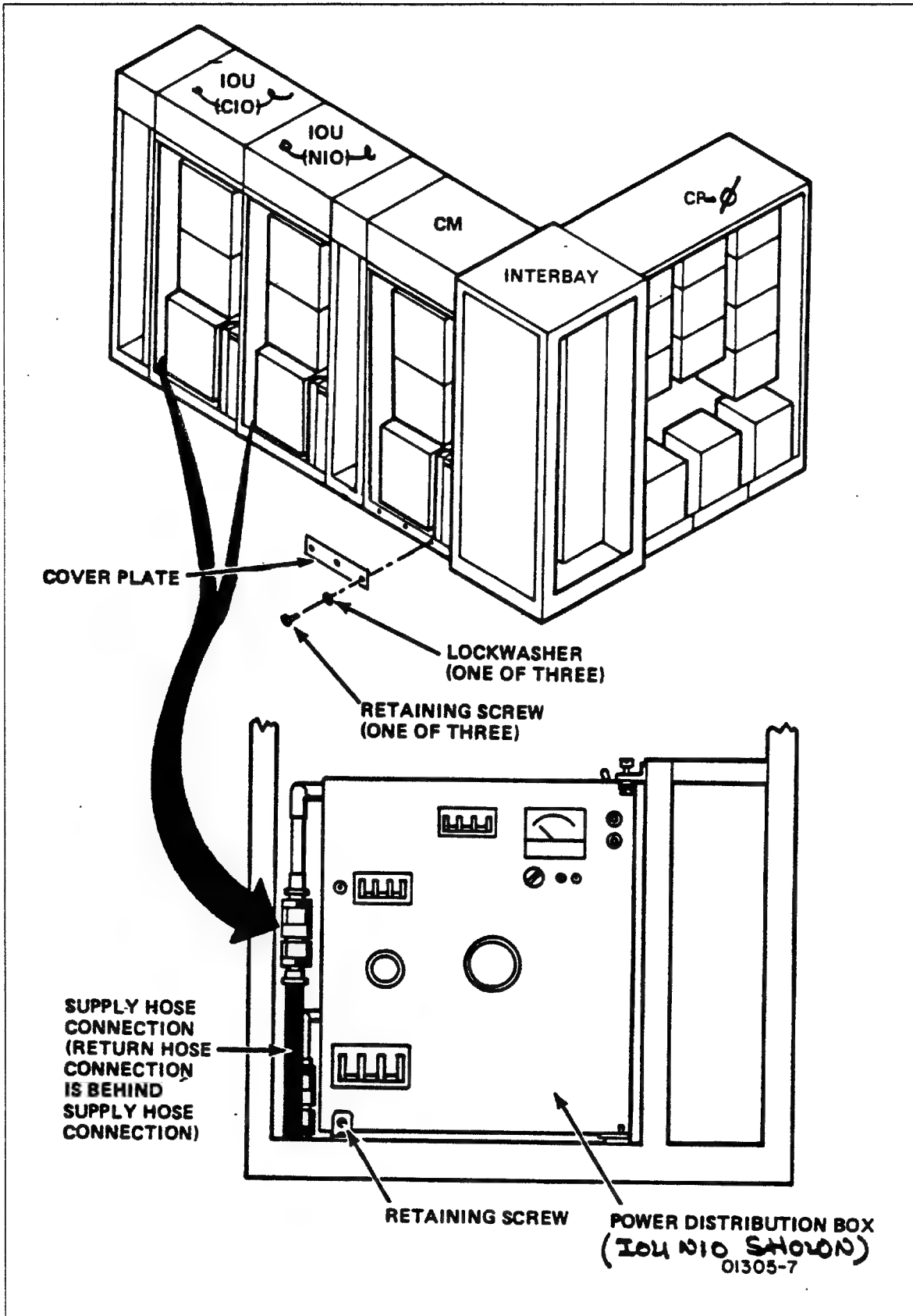


Figure 6-10. Supply and Return Water Hose Connections to IOU

Verify or Change Motor and Transformer Connections in WCU

Use this procedure to verify and change, if necessary, the pump motor wiring and control transformer wiring connections in the GH252-A/-C water cooling unit so that they correspond to available site voltage. Refer to figures 6-11 and 6-12.

Procedure prerequisites

- 50/60-Hz power to water cooling unit is off

Tools/parts required

- Phillips screwdriver
- Slotted screwdriver
- Digital multimeter, John Fluke Model 8020A or equivalent

Procedure

NOTE

DOES POWER LABEL ON TOP OF WATER COOLING UNIT POWER DISTRIBUTION BOX INDICATE THAT COOLING UNIT IS WIRED FOR SITE VOLTAGE?

- *If yes, go to next procedure.*
- *If no, go to step 1.*

— 1. Use screwdriver to remove cover from motor wiring junction box on side of motor.

— 2. If necessary, change motor wiring connections to match site voltage.

— a. For motor operation on 3-phase, 50/60-Hz power at 208 V:

Wire No.		Wire No.
1	to	7
2	to	8
3	to	9
4	to	5 and 6

— b. For motor operation on 3-phase, 50/60-Hz power at 240 V:

Wire No.		Wire No.
4	to	7
5	to	8
6	to	9

- 1 unconnected and insulated
- 2 unconnected and insulated
- 3 unconnected and insulated

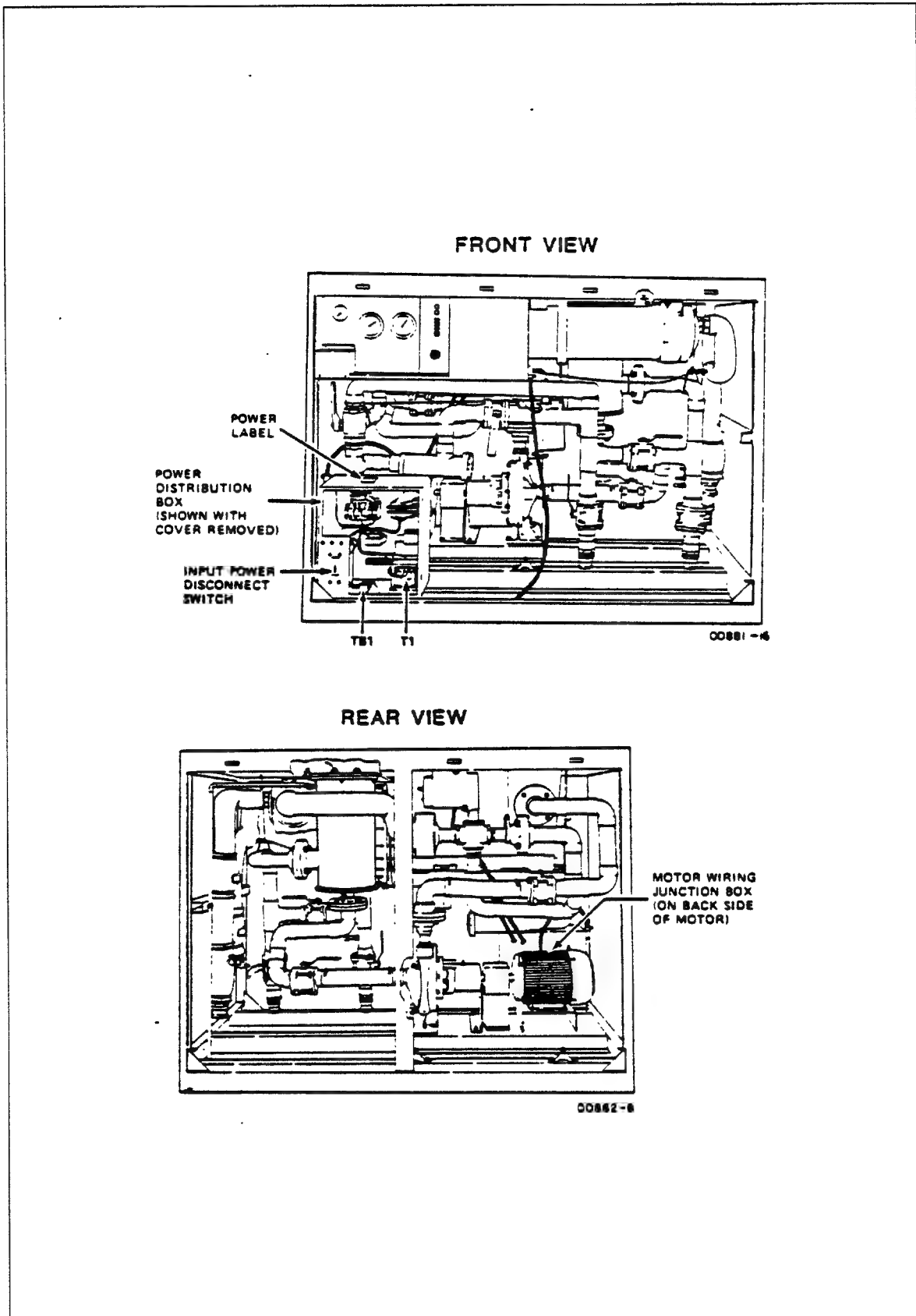


Figure 6-11. Wiring Connection Locations in GH252-A WCU

- ___ 3. Install cover on junction box.
- ___ 4. Remove vented cover from power distribution box.
- ___ 5. If necessary, change control transformer wiring connections to correspond to site voltage.

- ___ a. For water cooling unit operation on 3-phase, 50/60-Hz power at 416 V:

208-V Line	T1 Terminal No.	T1 Terminal No.
L1	H1	H3
L2	H5	H2

- ___ b. For water cooling unit operation on 3-phase, 50/60-Hz power at 416 V:

208-V Line	T1 Terminal No.	T1 Terminal No.
L1	H1	-
L2	H5	-
	H2	H3

- ___ 6. Remove applicable power label from bag at rear of power distribution box. Remove backing from label and stick label over nonapplicable label on top of power distribution box.

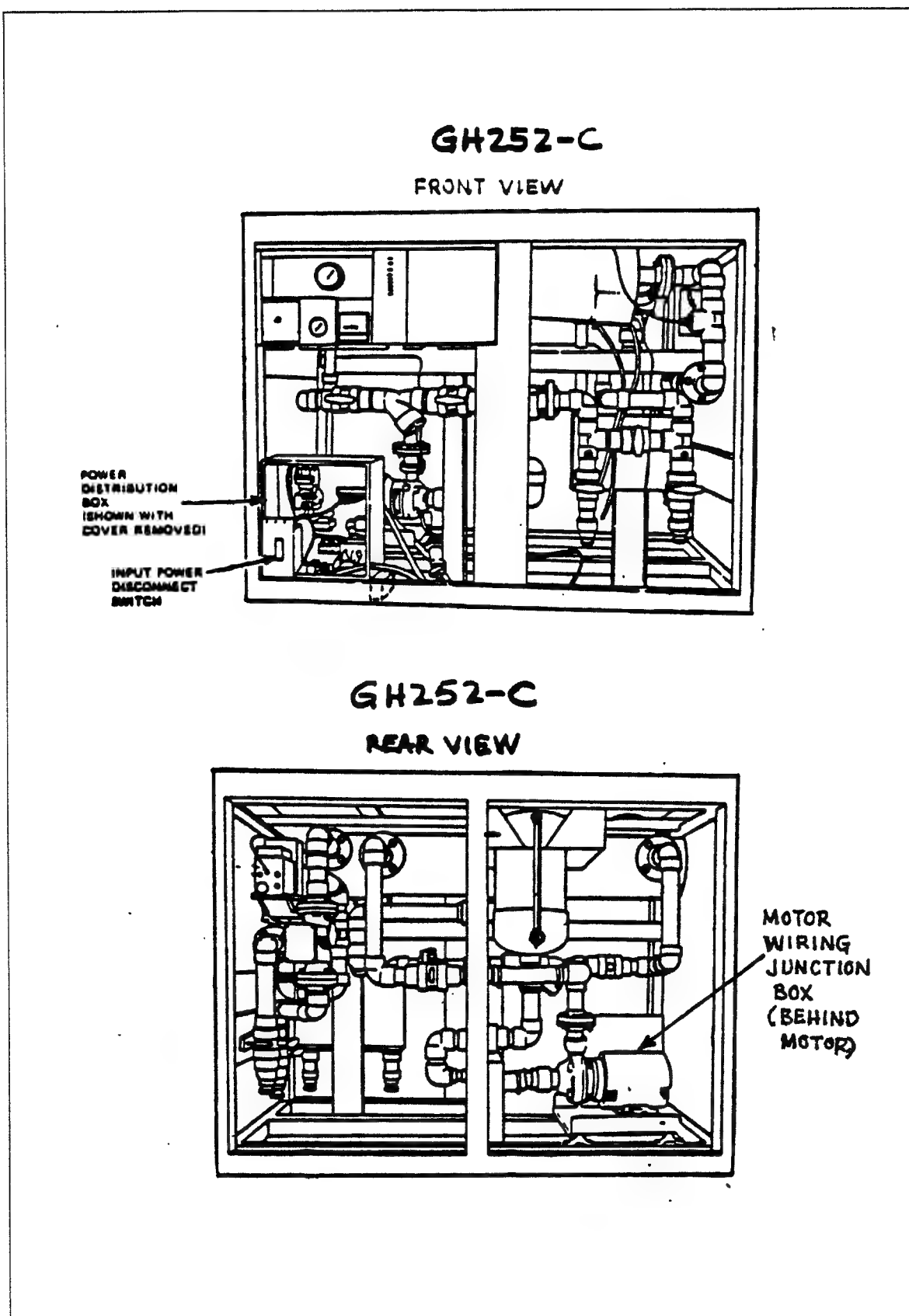


Figure 6-12. Wiring Connection Locations in GH252-C WCU

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Connect Power to Water Cooling Unit

This optional water cooling unit for the computer system has a drop cord with a power plug that connects directly to a preinstalled power plug at the computer site. When the site preinstalled power plugs are not installed and direct wiring connections are used in their places, drop cords are disconnected and direct wiring connections are made instead. The following procedures cover the optional direct wiring connections.

NOTE

A licensed electrician must make the following power connections under the supervision of a Control Data customer engineer or computer systems engineer. He must install that wiring according to all local electrical codes.

Use this procedure to connect 50/60-Hz power through a power cord or direct wiring to water cooling unit and to check and change, if necessary, the pump motor wiring and control transformer wiring connections so they match the available site voltage. Refer to figures 6-13, 6-14, and 6-15.

Procedure prerequisites

- 50/60-Hz power to water cooling unit power wiring is off.
- Preinstallation power inspection is complete, and power wiring is correct.

Tools/parts required

- Phillips screwdriver
- Slotted screwdriver
- Multimeter, John Fluke Model 8020A or equivalent
- Socket set

Procedure

NOTE

DOES POWER LABEL ON TOP OF WATER COOLING UNIT POWER DISTRIBUTION BOX INDICATE THAT COOLING UNIT IS WIRED FOR SITE VOLTAGE?

- *If no, go to step 1.*
 - *If yes, go to step 7.*
-

- ___ 1. Remove cover from motor wiring junction box on side of motor.
- ___ 2. Change motor wiring connections to match site voltage.
 - ___ a. For motor operation on 3-phase, 50/60-Hz power at 208 V:

Motor Wire No.		Water Cooling Unit Power Distribution Box
1 and T7	to	Phase wire
2 and T8	to	Phase wire
3 and T9	to	Phase wire
4 to 5 to 6		

- ___ b. For motor operation on 3-phase, 50/60-Hz power at 416 V:

Motor Wire No.		Water Cooling Unit Power Distribution Box
4 and T7	to	Phase wire
5 and T8	to	Phase wire
6 and T9	to	Phase wire
1 Unconnected and insulated		
2 Unconnected and insulated		
3 Unconnected and insulated		

- ___ 3. Install cover on junction box.
- ___ 4. Remove vented cover from power distribution box (see figure).
- ___ 5. Change control transformer T1 wiring connections to match site voltage.
 - ___ a. For water cooling unit operation on 3-phase, 50/60-Hz power at 208 V:

208 V Line		T1 Terminal No.		T1 Terminal No.
L1	to	H1	to	H3
L2	to	H5	to	H2

- ___ b. For water cooling unit operation on 3-phase, 50/60-Hz power at 416 V:

208 V Line		T1 Terminal No.		T1 Terminal No.
L1	to	H1		-
L2	to	H5		-
		H2	to	H3

- ___ 6. Remove applicable power label from bag at rear of power distribution box.
Remove backing from label and stick label over nonapplicable label on top of power distribution box.

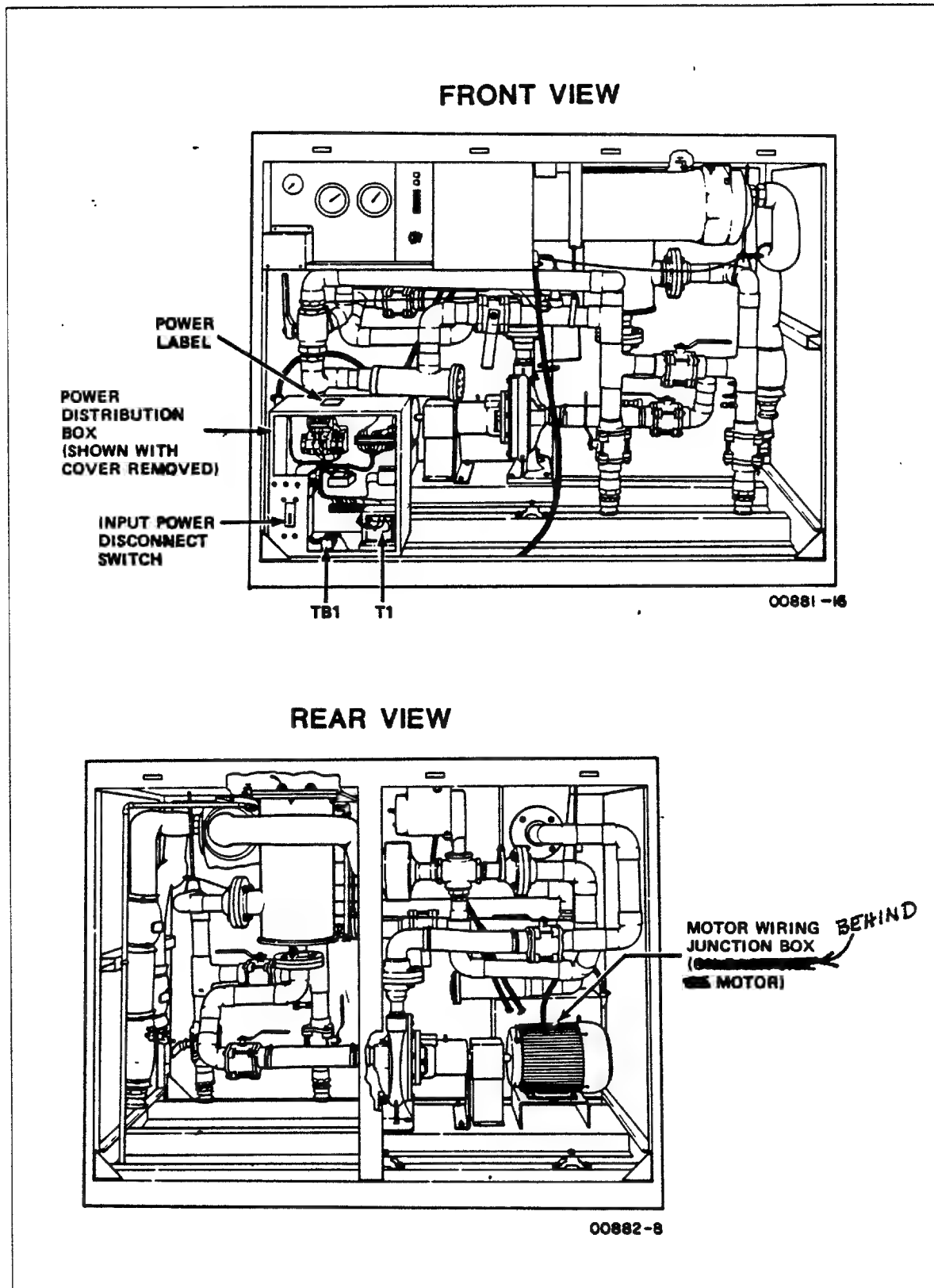


Figure 6-13. GH252-A Water Cooling Unit

- ___ 7. Set INPUT POWER DISCONNECT switch on water cooling unit to ON.
- ___ 8. Check TB1 terminals in power distribution box. Use a multimeter (set to an ohms scale) and check that no short circuits are present between SAFETY GROUND lug E1 and the following terminals.
 - ___ a. TB1-2
 - ___ b. TB1-3
 - ___ c. TB1-4
- ___ 9. Set INPUT POWER DISCONNECT switch to OFF.
- ___ 10. Connect power to water cooling unit, using one of the following power connection applications.
 - If site has 60-Hz power with power plug receptacles under raised floor, pull 60-Hz power cord (shipped connected to water cooling unit power distribution box) down through floor cutout. Connect cord to 60-Hz power receptacle.
 - If site has 50-Hz power with power plug receptacles under raised floor, disconnect 60-Hz power cord and connect a 50-Hz power cord to water cooling unit power distribution box. Connect cord to 50-Hz receptacle.
 - If site requires direct connection of power wires to water cooling unit, perform the following substeps in place of a power cord connection.

NOTE

All power connections must be made by a licensed electrician under the supervision of a Control Data customer engineer or computer system engineer. All local codes must be followed.

- ___ a. Disconnect and remove power cord from power distribution box.
- ___ b. Remove retaining ring from strain relief on preinstalled 50/60-Hz power wiring.
- ___ c. Pull power wiring up through power cutouts and into power distribution box.
- ___ d. Install retaining ring on strain relief on power wiring.
- ___ e. Connect power wiring to TB1 as follows:

50/60-Hz Circuit

Breaker

Power Distribution Box

Phase 1	to	TB1-2
Phase 2	to	TB1-3
Phase 3	to	TB1-4
Neutral	to	lug E1 (Safety ground)

- ___ f. Install power distribution box vented cover.

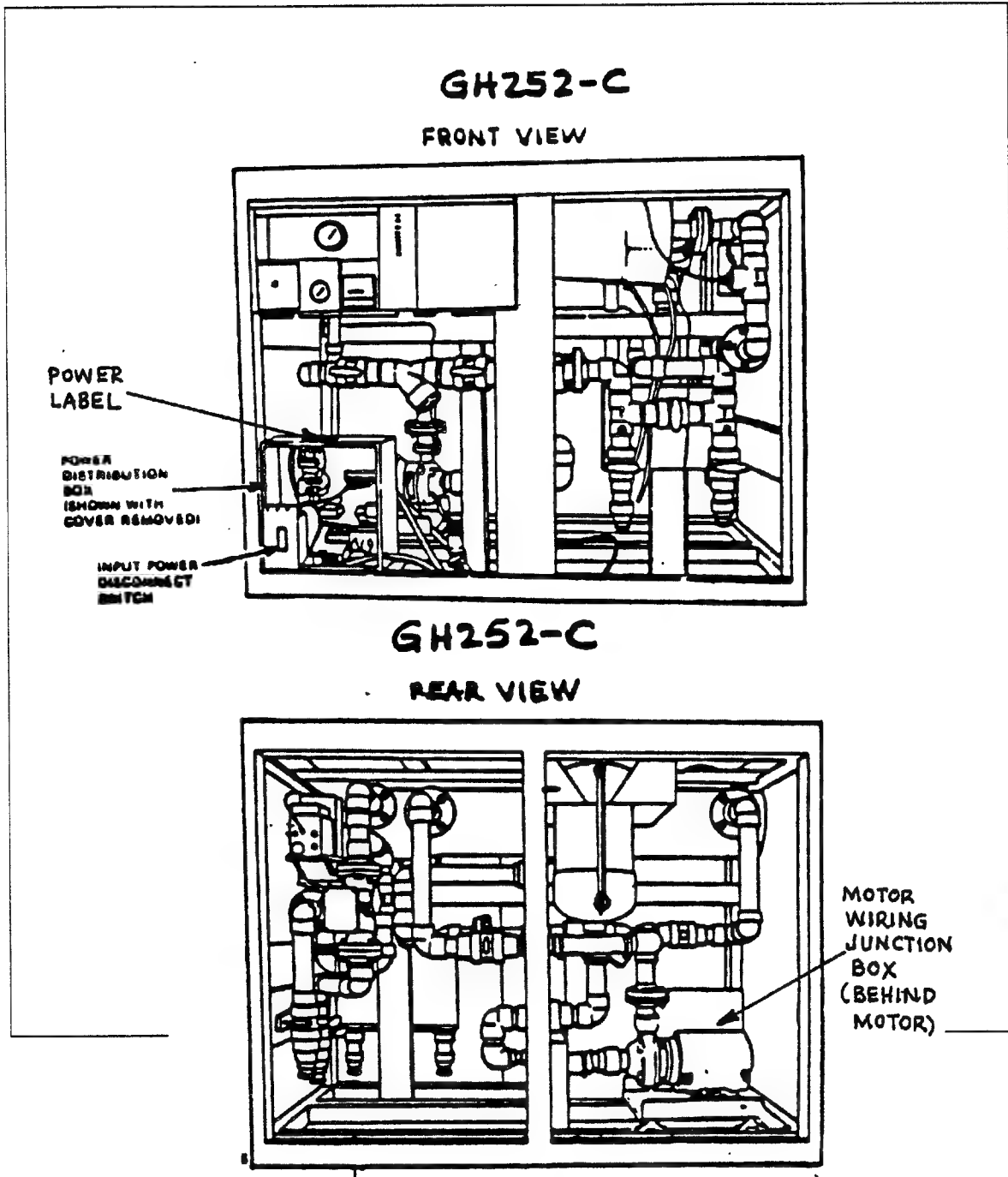


Figure 6-14. GH252-^C/_A Water Cooling Unit

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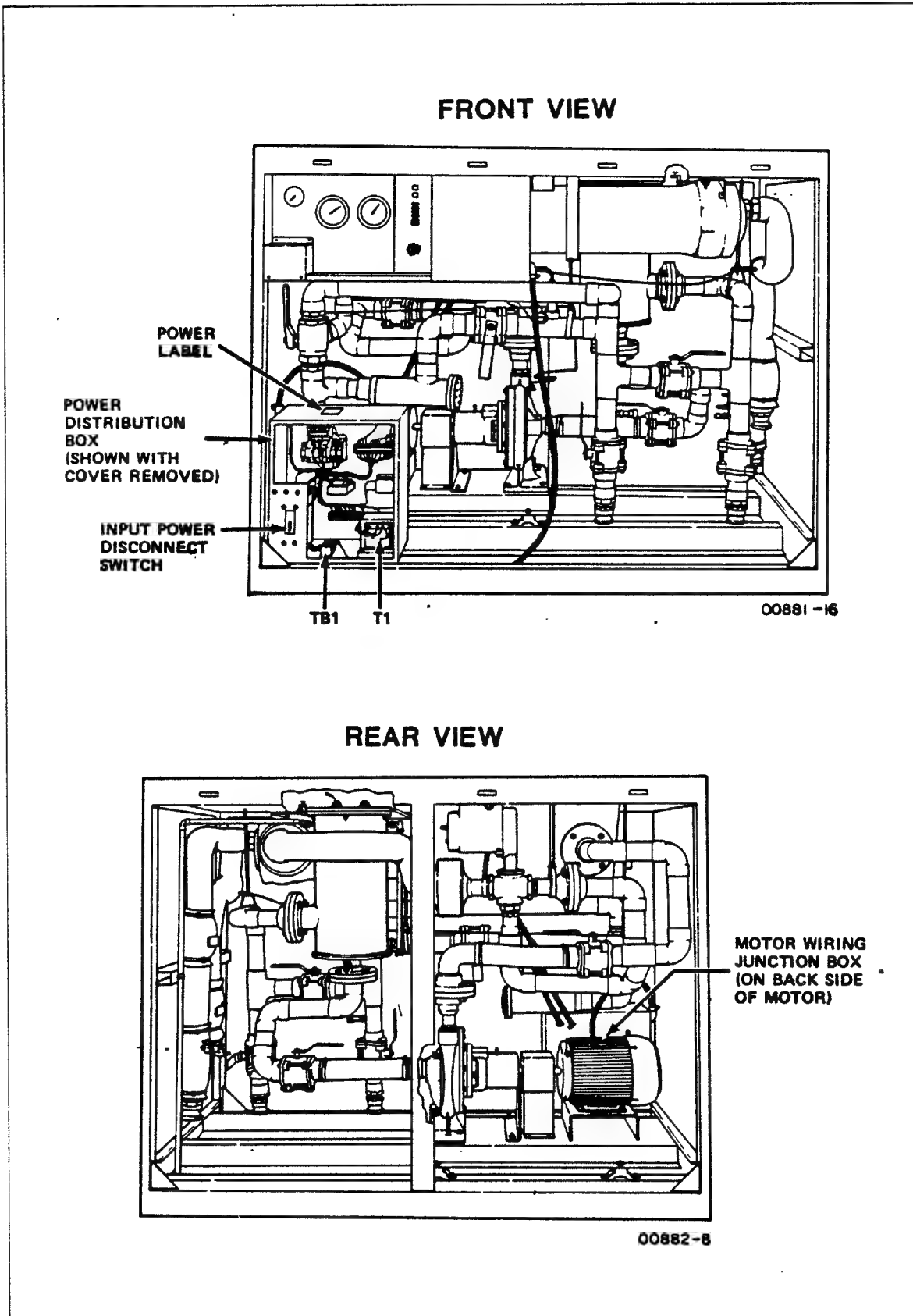


Figure 6-15. GH252-A Water Cooling Unit

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Prepare Water Cooling Unit

Use the following procedures to prepare the GH252-A WCU for initial usage. In general, the procedures are as follows:

- Check Valves on GH252-A/-C WCUs, CP, CM, and IOU
- Check Pump Rotation on GH252-A/-C WCUs
- Fill Water Tank in GH252-A/-C WCUs
- Check Pump Shaft Alignment on GH252-A WCU
- Bleed Air From GH252-A/-C WCUs
- Adjust Water Flow Rates to CP, CM, and IOU
- Check GH252-A/-C WCU Temperature, Pressure, and Flow
- GH252-A/-C Low Pressure Switch Adjustment
- GH252-A/-C High Pressure Switch Adjustment

Check Valves on GH252-A/-C WCUs, CP, CM, and IOU

Use this procedure to ensure that water cooling unit and column valves are in their normal operating positions. Refer to figures 6-16, 6-17, and 6-18.

Procedure prerequisites

- Connections for 50/60-Hz power to water cooling unit are complete.
- Wall-mounted 50/60-Hz circuit breaker that controls power to water cooling unit is set to OFF.
- Site water is at a temperature of not more than 10°C (50°F).

CAUTION

Improper valve settings prevent the water cooling unit from operating, cause a fault to occur a few minutes after the water cooling unit begins operation, or cause water to leak from the water cooling system.

Procedure

- 1. Open water cooling unit supply and return valves by turning them fully counterclockwise.

NOTE

Completely closing bypass valve and turning valve handle perpendicular to water pipe may cause a HIGH PRESSURE fault. Completely opening bypass valve and turning valve handle parallel to water pipe may cause a LOW PRESSURE fault.

- 2. Set chassis bypass valve approximately one-fourth turn open. A later adjustment of this valve may be necessary.
- 3. Check valves for the following:
- a. Heat exchanger air bleed valve is closed, fully clockwise.
 - b. Sight glass drain valve is closed, fully clockwise.
 - c. Strainer bypass valve handle is in up position.
 - d. Water pump drain valve is closed, fully clockwise.
 - e. Water tank drain valve is closed, fully clockwise.
- 4. Open supply and return valves in CP-0 and CP-1 columns, in IOU NIO and CIO and CM columns.
- 5. Open flow control valves on water return manifold(s) under raised floor for CP-0, CP-1, CM, and IOU.

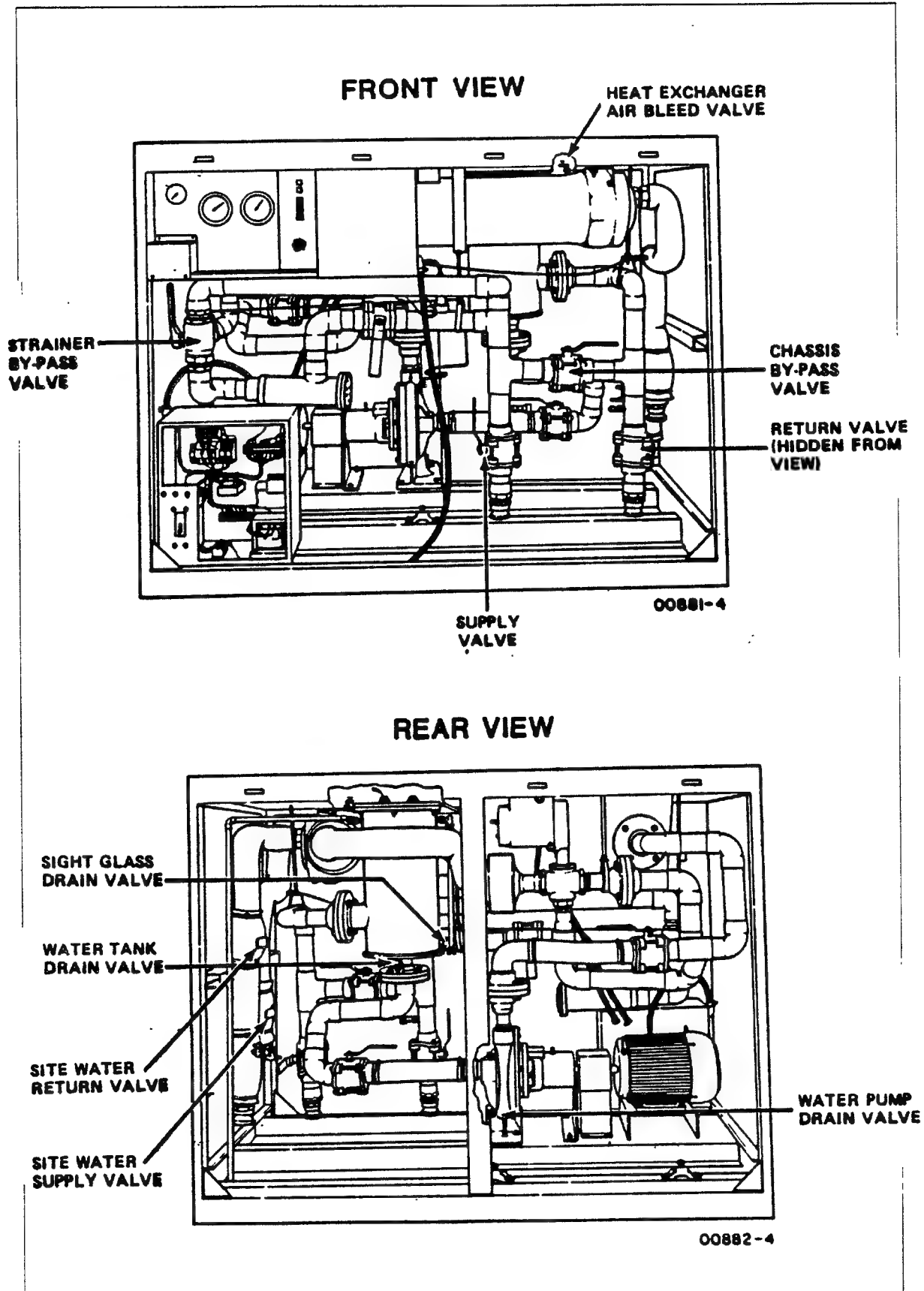


Figure 6-16. GH252-A WCU Valve Locations

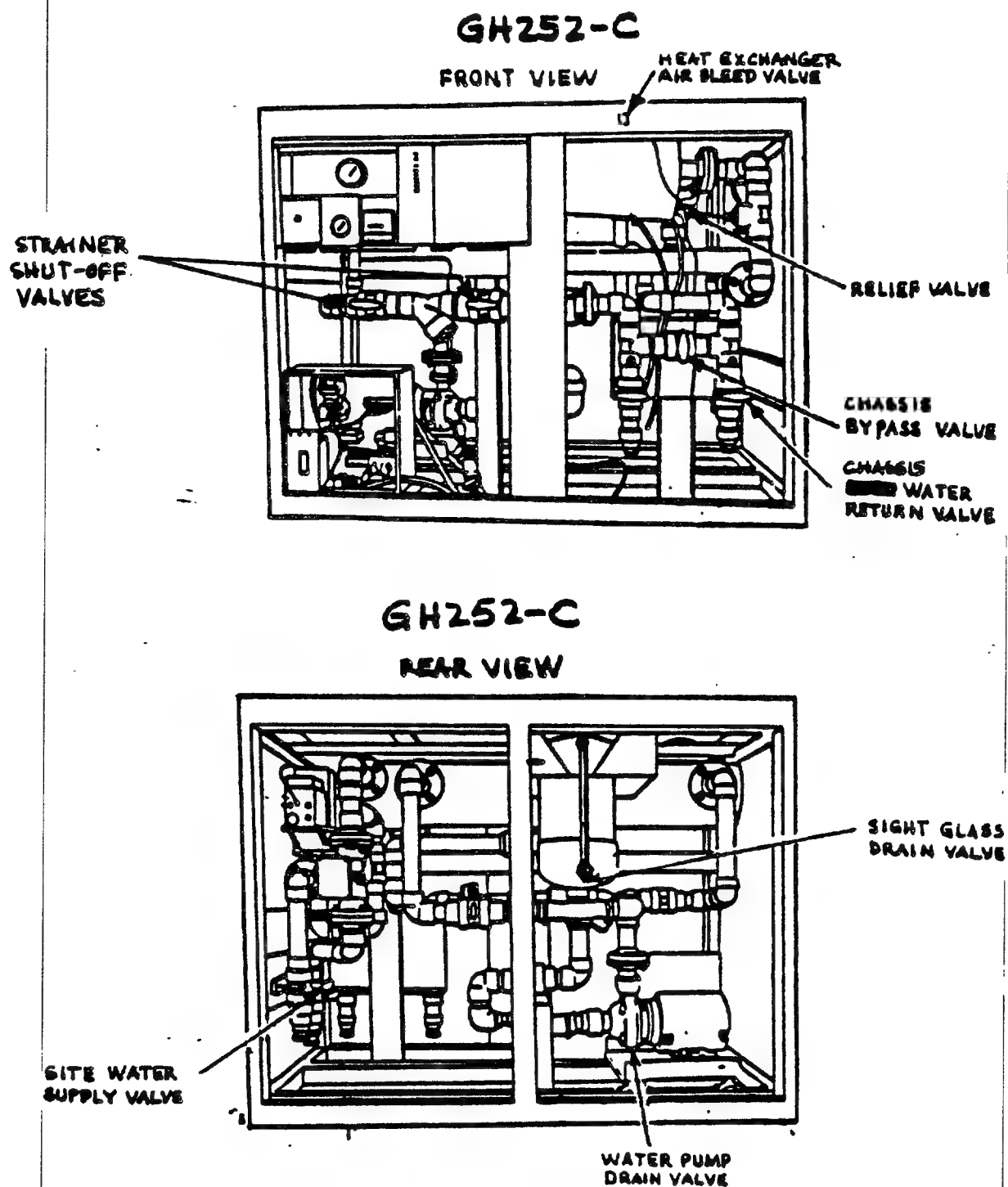


Figure 6-17. GH252-C WCU Valve Locations

- 6. Check that 3-way valve handles on site supply and return hose assemblies are set to position 1.

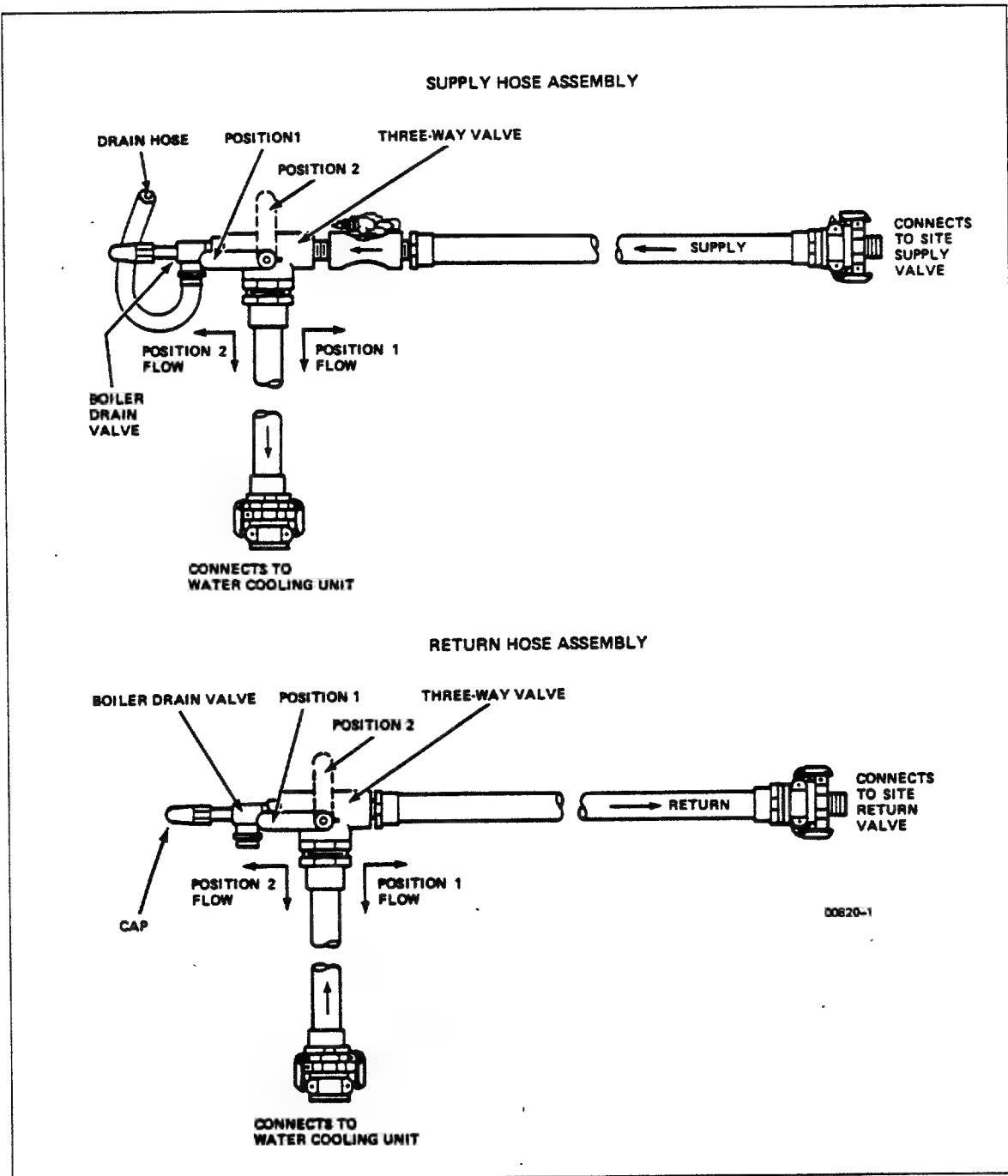


Figure 6-18. Site Supply and Return Hose Assemblies 3-Way Valves

Check Pump Rotation on GH252-A/-C WCUs

Use this procedure to ensure that the water cooling unit pump motor on GH252-A or GH252-C turns in the correct direction after the application of power. Refer to figure 6-19 and 6-20.

Procedure prerequisites

- Wall-mounted 50/60-Hz circuit breaker that controls power to water cooling unit is OFF.
- Valves for the water cooling unit are set according to previous procedures.
- Installer has verified that the pump motor and control transformer wiring are correct for available site power.

Tools/parts required

- Distilled water, 19 L to 23 L (5 gal to 6 gal). Later procedures require additional water to complete filling of water tank.
- Funnel.
- Adjustable wrench.

Procedure

- 1. Set INPUT POWER DISCONNECT circuit breaker on front of water cooling unit to OFF.
- 2. Set mode switch on water cooling unit front control panel to LOCAL.
- 3. Set MANUAL/AUTO switch on front of water cooling unit power distribution box to MANUAL.
- 4. Set wall-mounted 50/60-Hz circuit breaker that controls power to water cooling unit to ON.
- 5. Use adjustable wrench to remove fill plug from top of water tank.
- 6. Use funnel to add 19 L to 23 L (5 gal to 6 gal) of distilled water to water tank. Water cooling unit should indicate a LOW LEVEL fault before water tank is full.
- 7. Loosen water pump air bleed valve enough to allow water to seep from around valve and release any trapped air.
 - If water seeps from around screw, tighten it and go to step 9.
 - If water does not seep from around screw, perform these steps:
 - a. Remove screw from water pump.
 - b. Fill water pump completely, through screw hole, with distilled water.
 - c. Install screw and tighten.
- 8. Tighten air bleed valve.

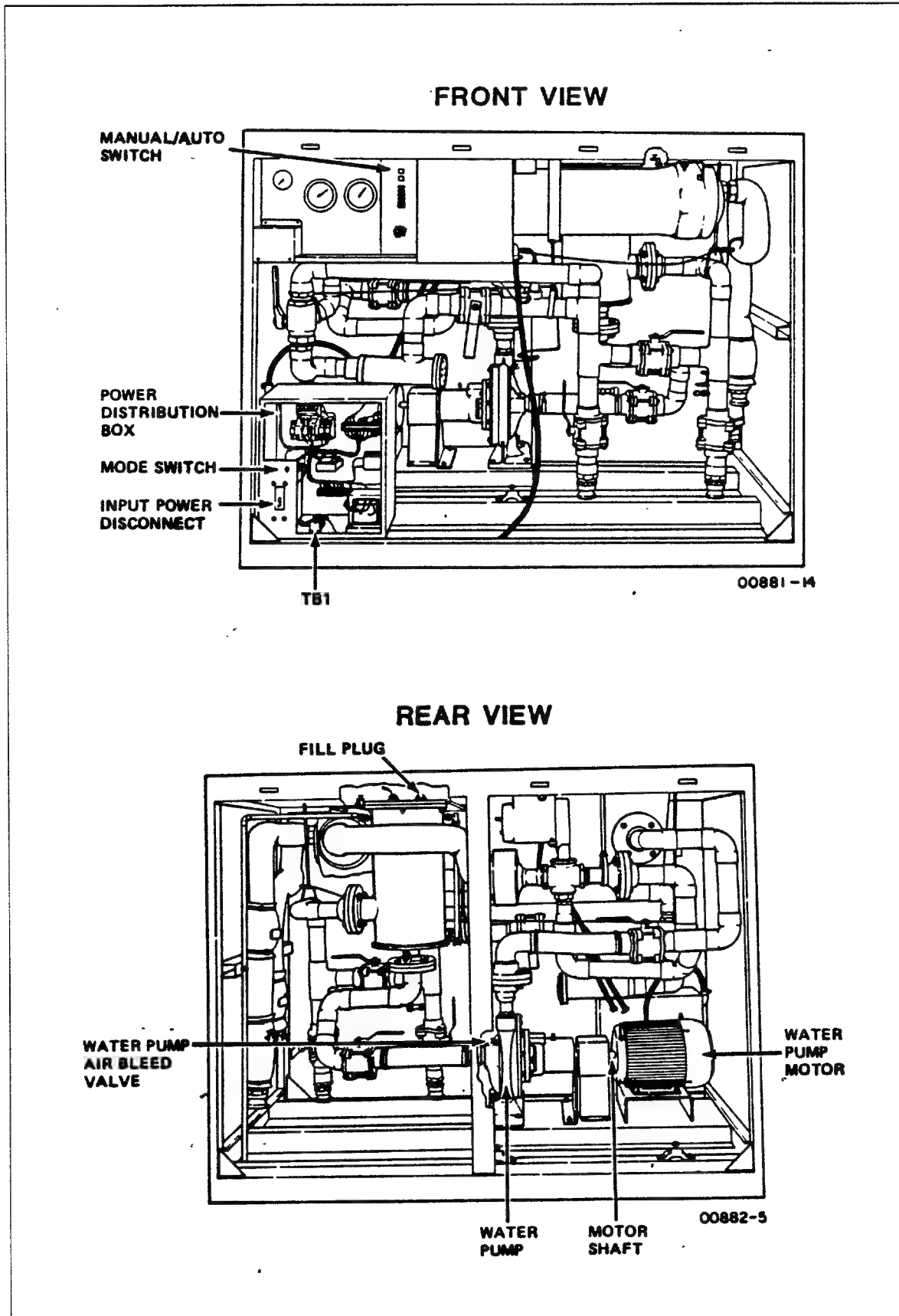


Figure 6-19. Pump Rotation Check on GH252-A WCU

- ___ 9. Rotate motor by momentarily applying 50/60-Hz power by setting INPUT POWER DISCONNECT circuit breaker on front of water cooling unit to ON and then to OFF.
- ___ 10. Observe rotation of water pump motor shaft as it slows down. Shaft must rotate in same direction as arrow at top of pump housing. If shaft does not rotate in correct direction, perform the following steps:
 - ___ a. Set wall-mounted circuit breaker that controls WCU 50/60-Hz power to OFF.
 - ___ b. Remove vented cover from water cooling unit power distribution box. Use multimeter to verify that no voltage is present.
 - ___ c. Interchange any two wires connected to TB1-2, TB1-3, and TB1-4 in 50/60-Hz power distribution box.
 - ___ d. Set wall-mounted circuit breaker that controls WCU 50/60-Hz power to ON.
 - ___ e. Repeat steps 9 and 10 to ensure correct rotation of motor.
- ___ 11. Set wall-mounted circuit breaker that controls WCU 50/60-Hz power to OFF.
- ___ 12. Replace front cover on power distribution box, if removed.
- ___ 13. Do not replace fill plug on top of water tank at this time.

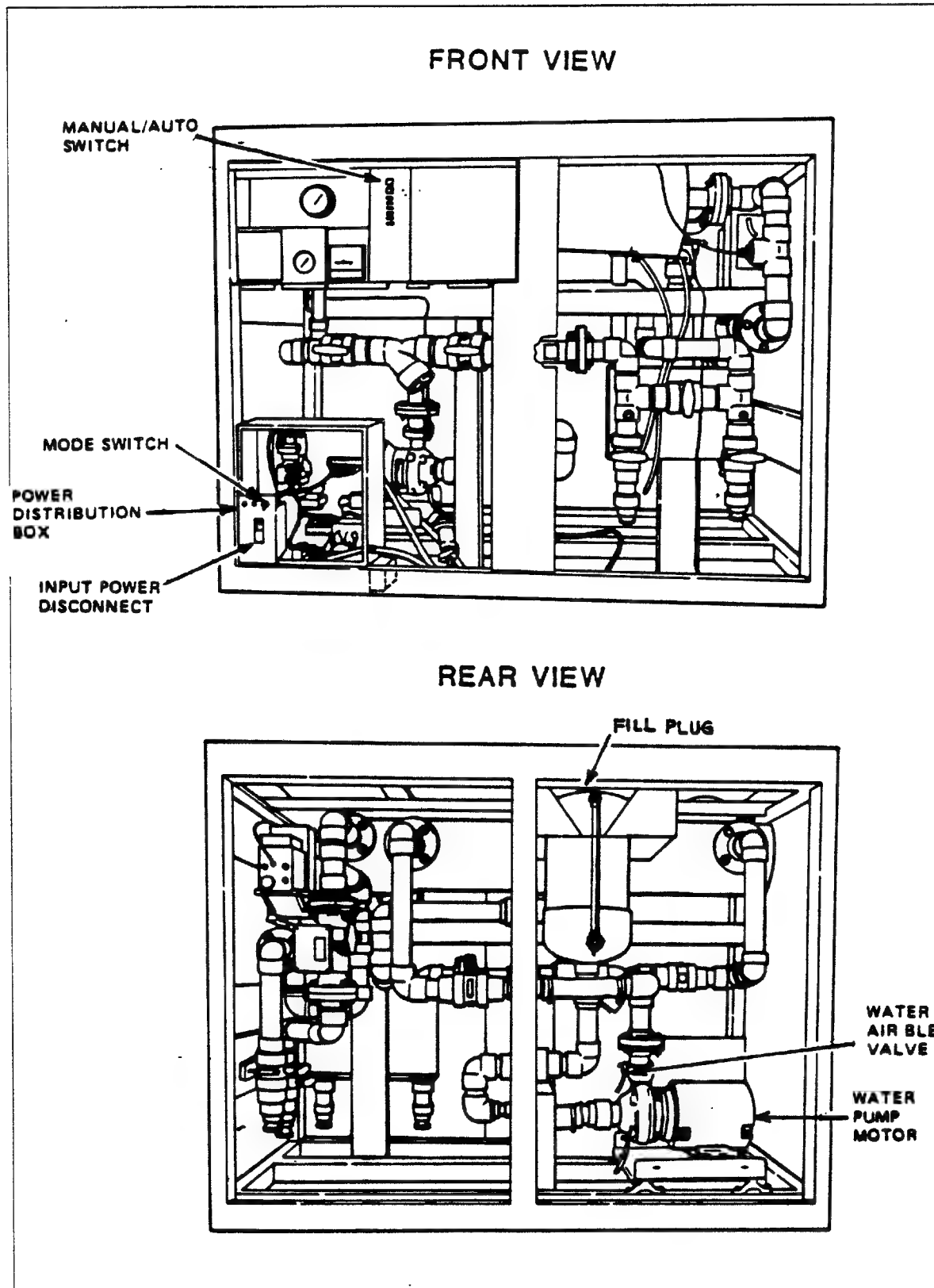


Figure 6-20. Pump Rotation Check on GH252-C WCU

Fill Water Tank in GH252-A/-C WCUs

Use this procedure to complete the filling of the water tank in the GH252-A or GH252-C WCU. Refer to figures 6-21, 22, and 6-23.

Procedure prerequisites

- Water cooling unit water tank fill plug is removed, and tank contains 19 L to 23 L (5 gal to 6 gal) of distilled water from pump rotation check.
- All flow control valves on the manifolds are open.
- Any water manifold port that does not have a hose connection has a cap.
- Mode switch on WCU is set to LOCAL, and MANUAL/AUTO switch is set to MANUAL.

Tools/parts required

- Distilled water, 102 L to 106 L (27 gal to 28 gal)
- Cobratec corrosion inhibitor
- Biocide chemical microorganism control
- Water treatment pH indicator kit
- Disposable gloves
- Funnel
- Safety glasses
- Water tank drain hose
- Empty water container, 4 L to 7.6 L (1 gal to 2 gal)
- Paper tissues or towel for absorbing water

Procedure

1. Set wall-mounted 50/60-Hz circuit breaker that controls WCU power to ON.

NOTE

Water added to the water tank may appear in the sight glass to have a green/blue tint or to be milky in color. These conditions are due either to antifreeze residue or excessive air bubbles. The green/blue tint is a normal condition that clears up in several hours; however, the milky color indicates an excessive amount of air bubbles in the system due to a misadjustment of the bypass valve.

Do not fill tank more than three-fourths full with power removed.

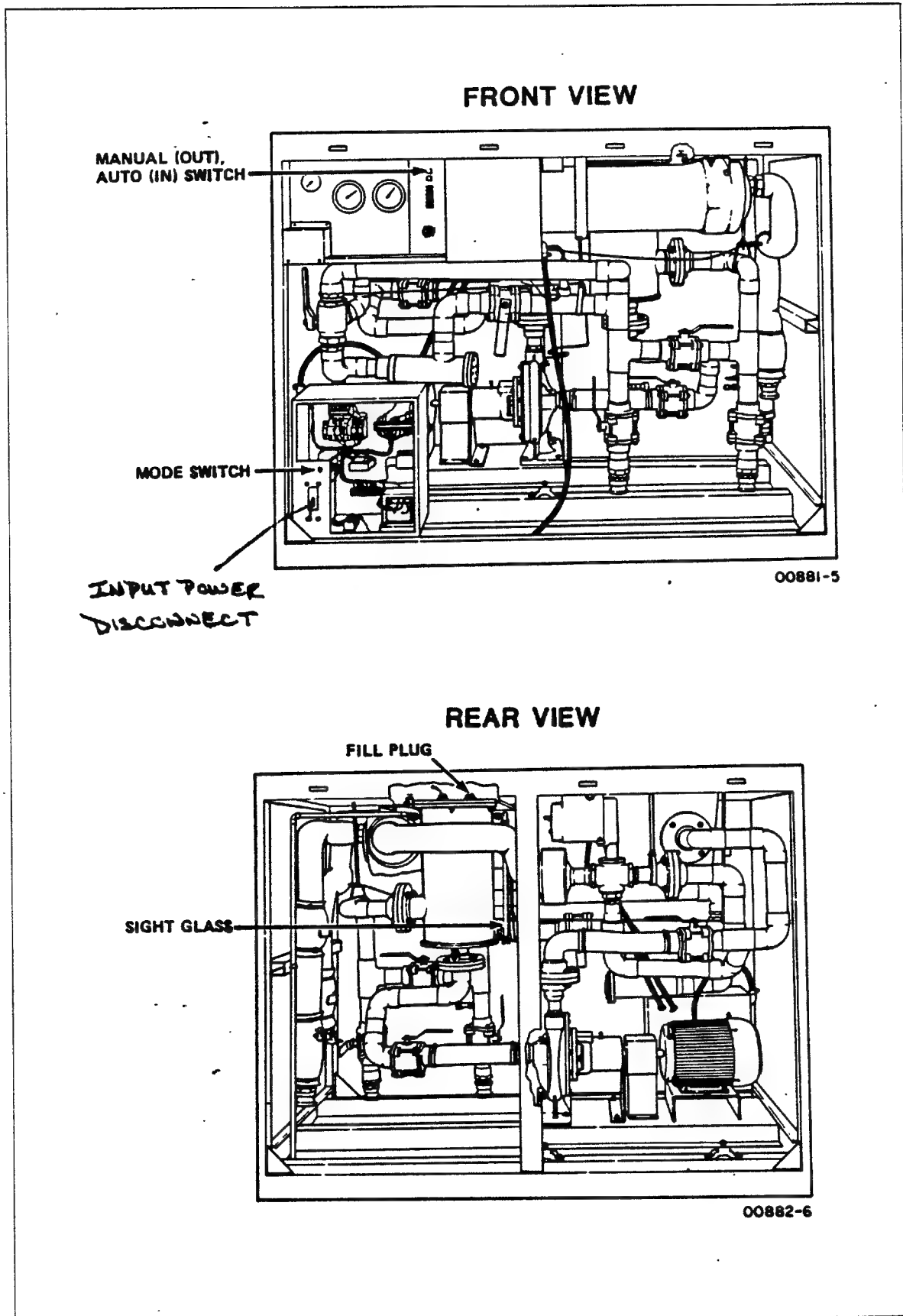


Figure 6-21. Water Tank Filling on GH252-A WCU

- 2. Use a funnel to add distilled water to water tank at fill plug hole until sight glass is three-fourths full, while checking for LOW/HIGH LEVEL faults.
- 3. Place paper tissues around water pump air bleed valve, and open valve until air escapes. Remove tissues.

CAUTION

If water cooling unit (older GH252-As only) vibrates after power is applied, shut power off and perform the CHECK PUMP SHAFT ALIGNMENT ON WCU procedure in this section.

- 4. Set INPUT POWER DISCONNECT circuit breaker on front of unit to ON. After water pump motor runs a few seconds, water level in sight glass goes down as water circulates throughout cooling system.

NOTE

To avoid LOW WATER LEVEL faults, open water valves on equipment one at a time.

- 5. Add water as necessary to maintain water level in sight glass at three-fourths full. If water pump motor stops while water is being added and HIGH/LOW LEVEL indicator on water cooling unit indicator panel lights, observe water cooling unit sight glass.
 - If sight glass indicates a low water level, repeat steps 2 and 4.
 - If sight glass indicates a high water level, perform the following substep(s):
 - a. Bleed air from chassis. (Refer to bleed procedures later in this part of the manual.) Continue with these substeps only if high water level is still present.
 - b. Set INPUT POWER DISCONNECT switch on water cooling unit to OFF.
 - c. Attach drain hose to water tank drain valve, and place hose end in empty water container.
 - d. Open water tank drain valve, and drain water into container until sight glass indicates three-fourths full.
 - e. Close drain valve.
 - f. Repeat steps 2 and 3 until water level in sight glass remains at three-fourths full.
 - g. Remove drain hose and container.

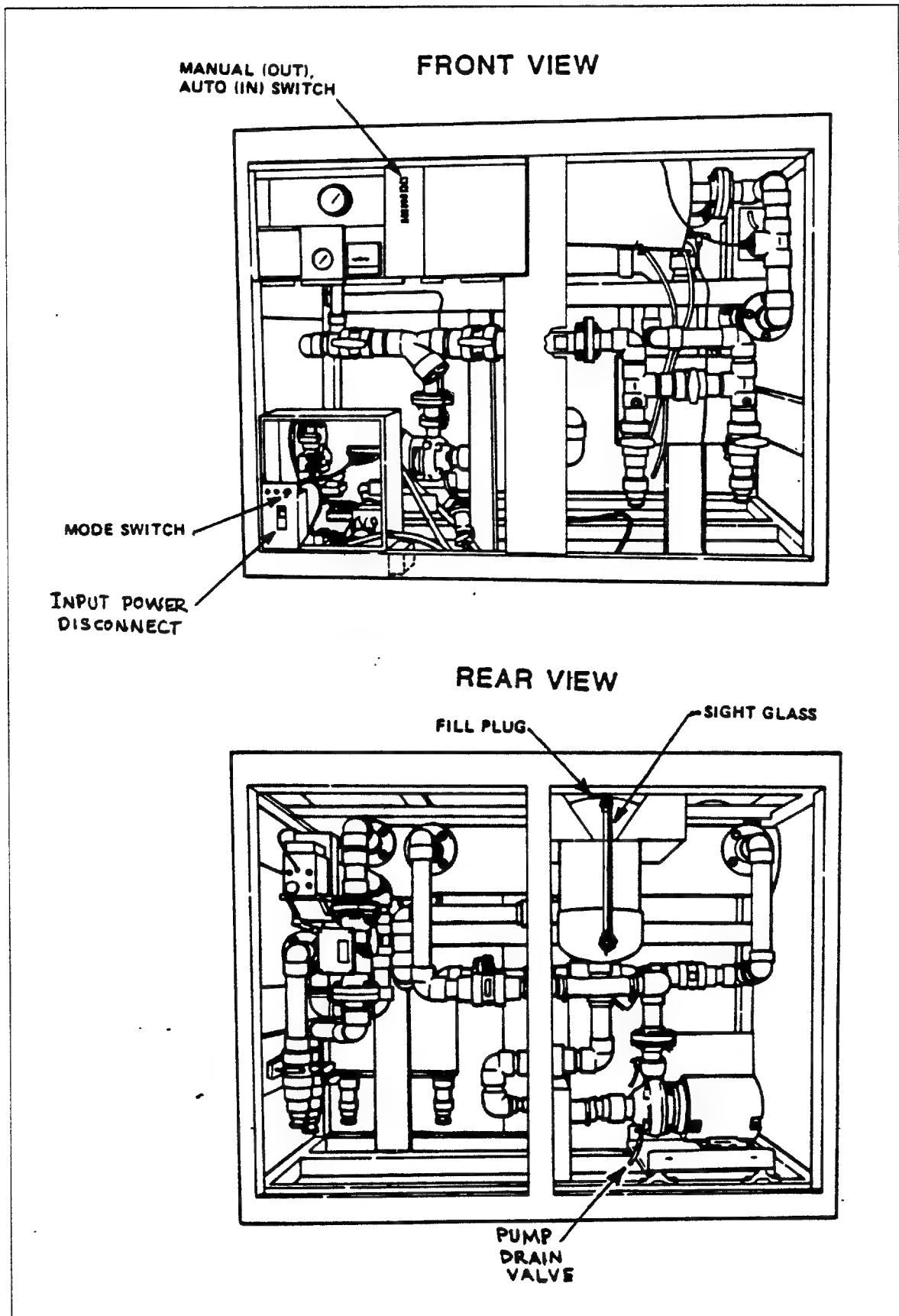


Figure 6-22. Water Tank Filling on GH252-C WCU

- 6. Permit water cooling unit to operate for a time to allow trapped air to circulate through system and escape from water tank. Bubbles stop surfacing in tank when trapped air is released.
- 7. Inspect all water connections in WCU, CM, CP-0, CP-1 (if present) and IOU for leaks. Correct any leaks.
- 8. Check alkalinity of water in water cooling unit, using water treatment pH indicator kit (see figure) as follows:
 - a. Drain small amount of water from water tank drain valve (on GH252-A or pump drain valve on GH252-C) into clean container. Pour some water from container into both color viewing tubes. Rinse tubes thoroughly and leave them empty.

WARNING

The chemicals in the wide range 4 pH indicator solution may be hazardous to the health and safety of the user if inappropriately handled. Read all warnings included with the test kit before using it.

- b. Pour additional water from container into both color viewing tubes, filling tubes only to their 5-mL marks.
- c. Add six drops of wide range 4 pH indicator solution to one sample tube. Cover tube with stopper, and swirl it to mix solution with water sample.
- d. Insert tube with treated water into right opening of color comparator.
- e. Insert tube with untreated water sample into left opening of color comparator.
- f. Hold color comparator up to light source and view color comparator openings. Rotate color disc by turning its edge to obtain color match in openings.
- g. Read pH indicator on front of color comparator. Correct alkalinity (pH) indication is between 7.0 and 8.5.

If pH is more than 8.5, dilute water in water cooling unit as follows:

- 1) Drain 3.8 L (1 gal) of water from water cooling unit.
- 2) Add 3.8 L (1 gal) of untreated distilled water to water cooling unit.
- 3) Wait 15 min and repeat this entire step to ensure correct pH level between 7.0 and 8.5.

If pH is less than 7.0 increase pH level as follows:

- 1) Put on safety glasses and disposable rubber or plastic gloves.

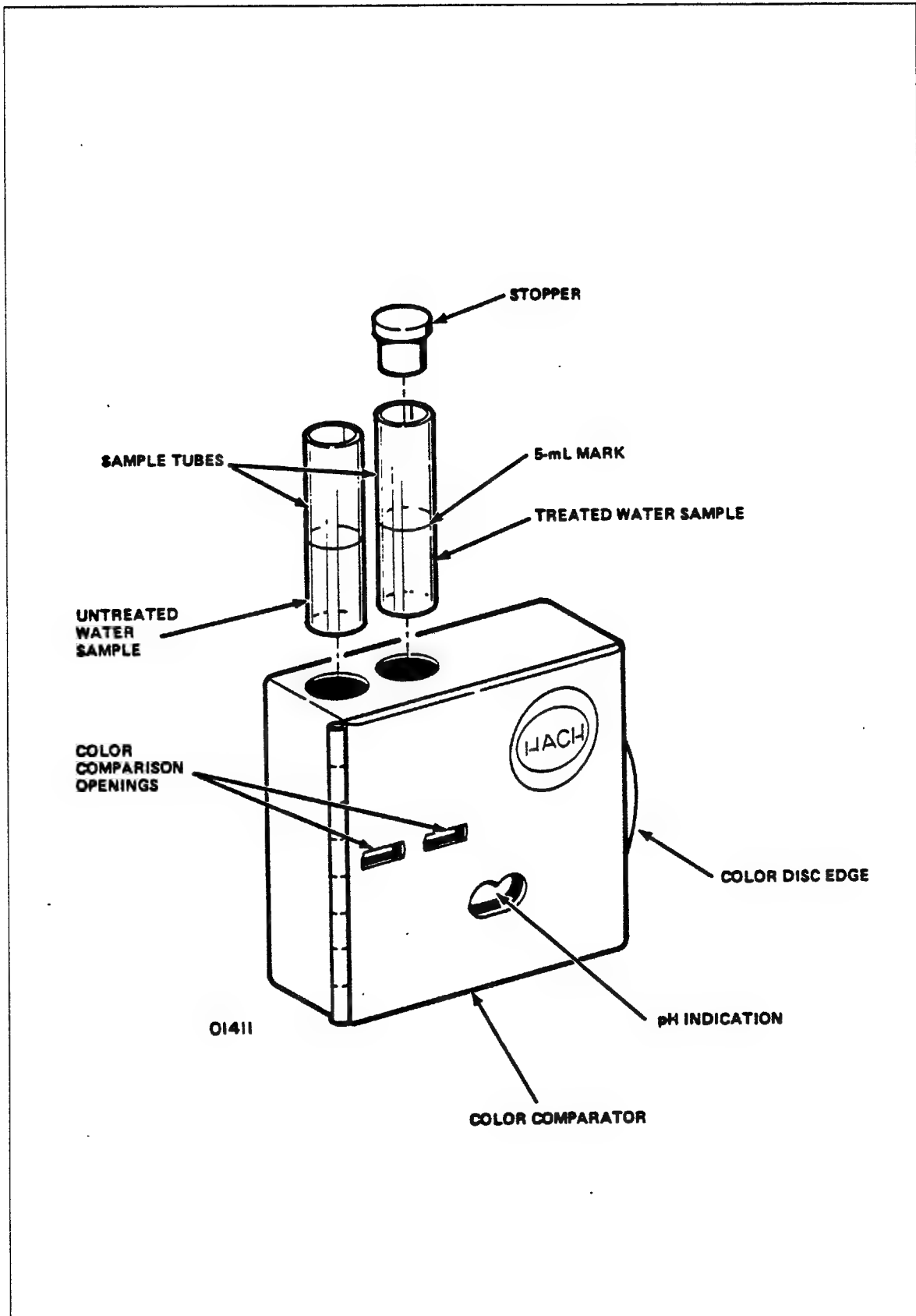


Figure 6-23. Water Treatment pH Indicator Kit

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WARNING

Do not inhale vapors from Cobratec or allow it to contact skin or eyes. Cobratec contains a sodium hydroxide solution, which can severely burn skin and eyes and cause harm if a large quantity is inhaled.

- ___ 2) Add one drop of Cobratec corrosion inhibitor to each 3.8 L (1 gal) of water in water tank. Cobratec has an indefinite shelf life.
- ___ 3) Wait 15 min and repeat this entire step to ensure correct pH level between 7.0 and 8.5
- ___ 9. Rinse and store sample tubes in color comparator.
- ___ 10. Leave safety glasses and gloves on.

WARNING

Do not inhale vapors from biocide chemical microorganism control or allow it to contact skin or eyes. The chemical microorganism control contains polyoxyethylene (dimethyliminio) ethylene (dimethyliminio) ethylene dichloride, a substance that can cause severe eye and skin irritation.

- ___ 11. Wait at least 15 min after adding Cobratec (step 12). Then add 4 drops of biocide chemical microorganism control to each 3.8 L (1 gal) of water in water tank. Note expiration date on biocide container to ensure its usability.
- ___ 12. Remove safety glasses and gloves.

Check Pump Shaft Alignment on GH252-A WCU

Use this procedure to check shaft alignment between the pump and pump motor prior to operation of GH252-A WCUs only. Refer to figure 6-24.

NOTE

Perform this procedure only if the GH252-A WCU vibrates when powered up.

Procedure prerequisites

- Power to water cooling unit is off

Tools/parts required

- 7/16-in wrench
- Coupling gauge
- 0.015-in feeler gauge

Procedure

- 1. Remove shaft coupling guard using a 7/16-inch wrench to remove four mounting bolts.
- 2. Check coupling parallel alignment as follows:
 - a. Place straight edge of coupling gauge across coupling, pressing it firmly to most protruding of the two coupling flanges. This may leave a gap between gauge and most recessed flange.
 - b. Try to insert 0.015-in feeler gauge into gap. An acceptable gap width will not allow insertion of gauge.
 - c. Repeat steps 2a and 2b at several other points around coupling flange. If feeler gauge inserts at any point, replace pump and motor assembly.
- 3. Check coupling maximum angular alignment as follows:
 - a. Try to insert number 1 edge of coupling gauge at gap between flanges at top of coupling.
 - b. Measure points at 90° increments around coupling. If coupling gauge inserts at any point, replace pump and motor assembly.
- 4. Check coupling minimum angular alignment as follows:
 - a. Insert number 2 edge of coupling gauge at gap between flanges at top of coupling. An acceptable gap width will allow insertion of gauge.
 - b. Measure points at 90° increments around coupling. If coupling gauge does not insert into any point, replace pump and motor assembly.
- 5. Install shaft coupling guard.

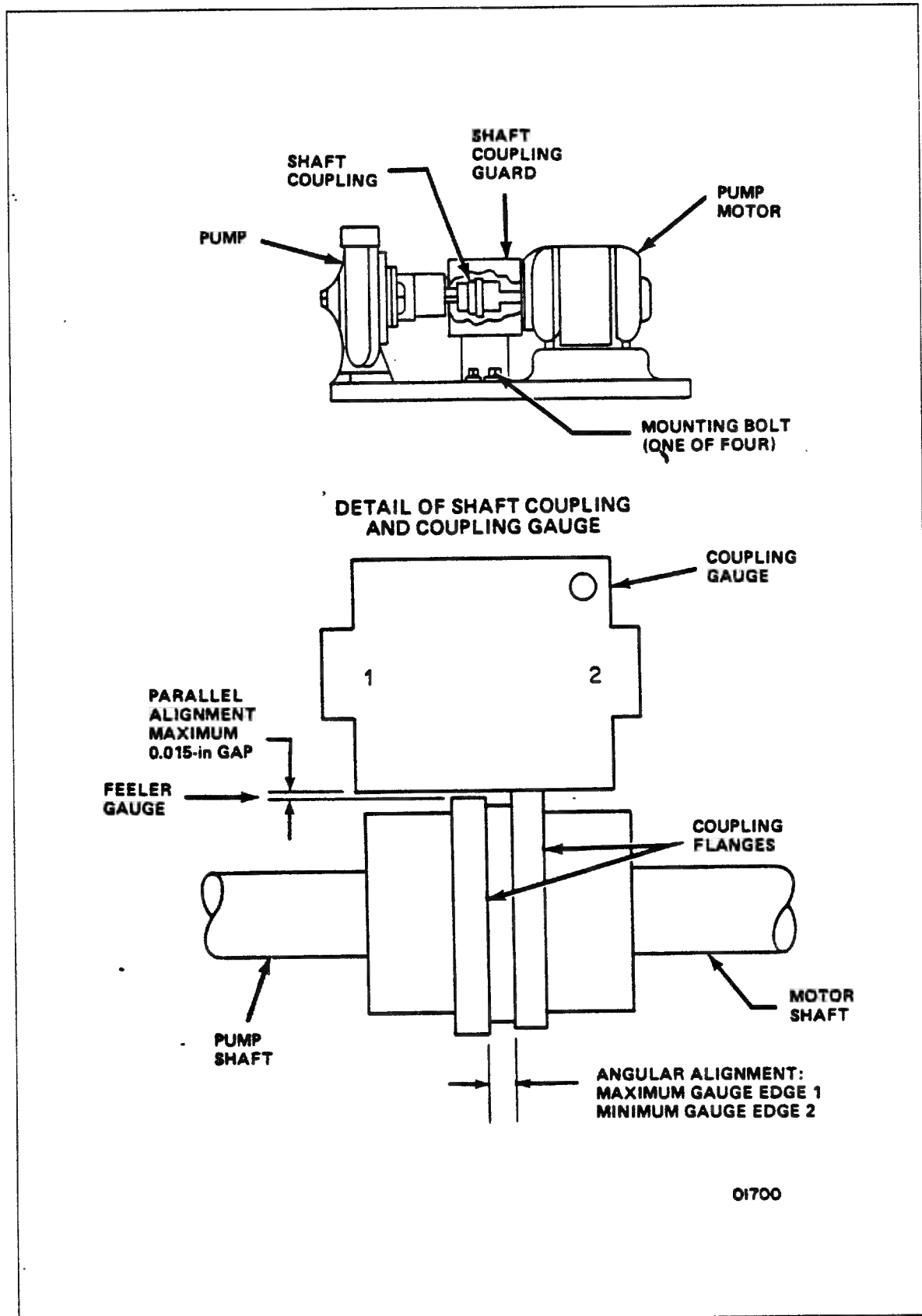


Figure 6-24. Pump Shaft Alignment Check - GH252-A WCUs Only

Bleed Air From GH252-A/-C WCUs

Use this procedure to release any trapped air from site water lines in the water cooling unit. Refer to figure 6-25.

Procedure prerequisites

- Water cooling unit is operating

Tools/parts required

- Paper tissues or cloth towel for absorbing water

Procedure

- 1. Open site (customer) water supply and return valves to water cooling unit.
- 2. Place paper tissues or towel around heat exchanger air bleed valve to absorb water.
- 3. Open air bleed valve slightly until air escapes and water begins spraying out. Close valve.
- 4. Remove towel or tissues.
- 5. Allow water cooling unit to operate several hours. This action permits air to escape from chassis water before installing fill plug on top of water cooling unit water tank.

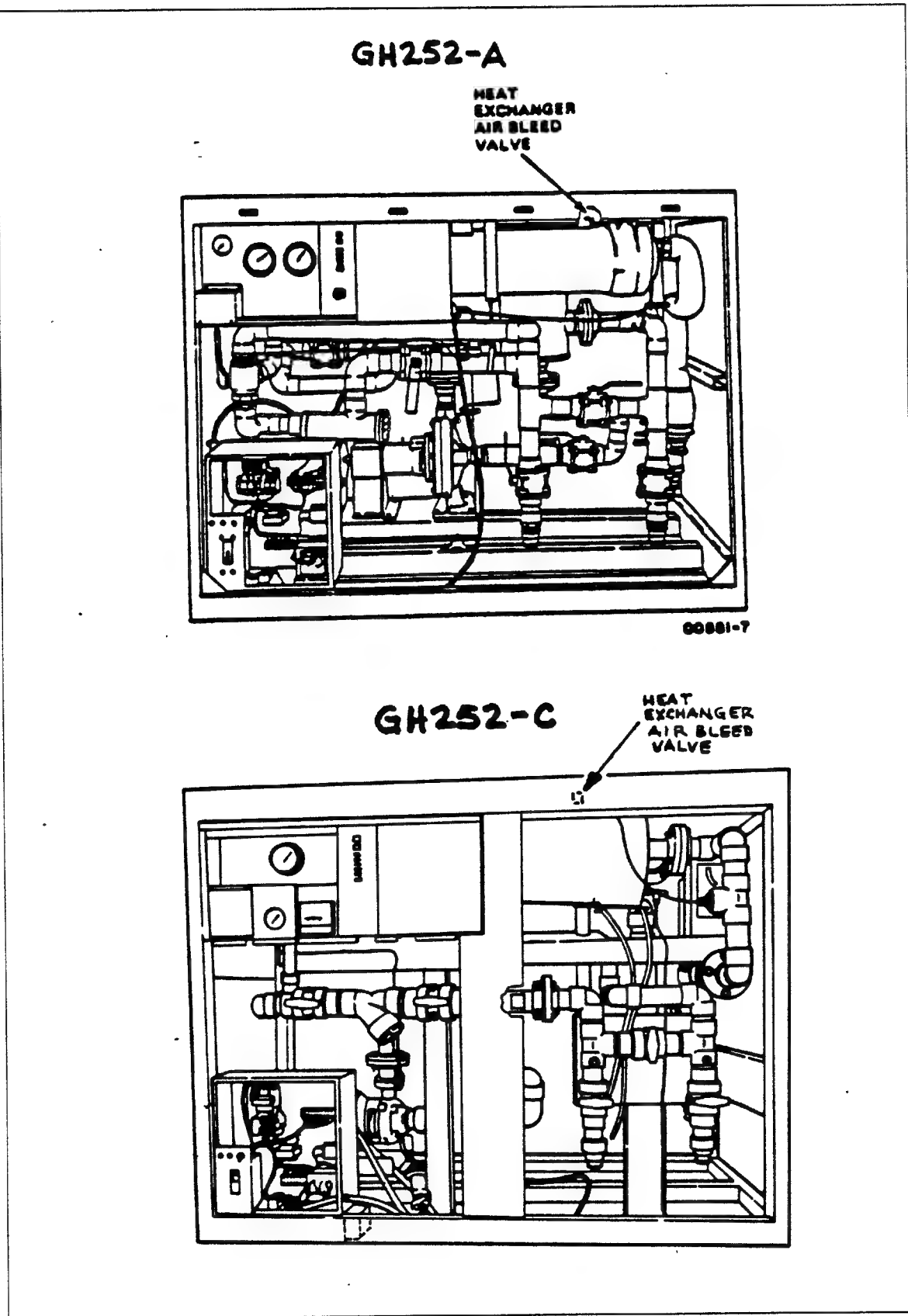


Figure 6-25. Air Bleed Valves in GH252-A/-C WCUs

Adjust Water Flow Rates to CP, CM, and IOU

Use the following procedures to adjust the water manifold flow rates to the CP-0, CP-1 (if present), CM, IOU NIO cabinet, IOU CIO cabinet, and water cooling units. Refer to figures 6-26 and 6-27.

Procedure prerequisites

- All previous procedures in this chapter have been completed and the water cooling unit is operating

Tools/parts required

- Distilled water, as required to maintain water level in water cooling unit
- Funnel
- Water tank drain hose
- Empty water container, 4 L to 7.6 L (1 gal to 2 gal)

Procedure

- 1. Remove floor tiles above return water manifolds.
- 2. Remove flow meter covers by pulling them upward and off.
- 3. Set flow meters on water return manifolds by turning valve adjust handles to obtain following rates. Turning valve adjust handles counterclockwise increases water flow rate.

NOTE

The following flow rates are minimum. They may be somewhat higher when 60-Hz voltage is connected to the WCU but should be as close as possible to the rates shown for a 50-Hz voltage connection.

- a. CP-0 and CP-1 (if present) column 1 flow meters to 11.4 L (3 gal) per min.
 - b. CP-0 and CP-1 (if present) column 2 flow meters to 11.4 L (3 gal) per min.
 - c. CP-0 and CP-1 (if present) column 3 flow meters to 15.1 L (4 gal) per min.
 - d. CM flow meter to 7.6 L (2 gal) per min.
 - e. IOU NIO cabinet flow meter to 15.1 L (4 gal) per min.
 - f. IOU CIO cabinet flow meter to 15.1 L (4 gal) per min.
- 4. Repeat step 3 until all flow rates are adjusted correctly.

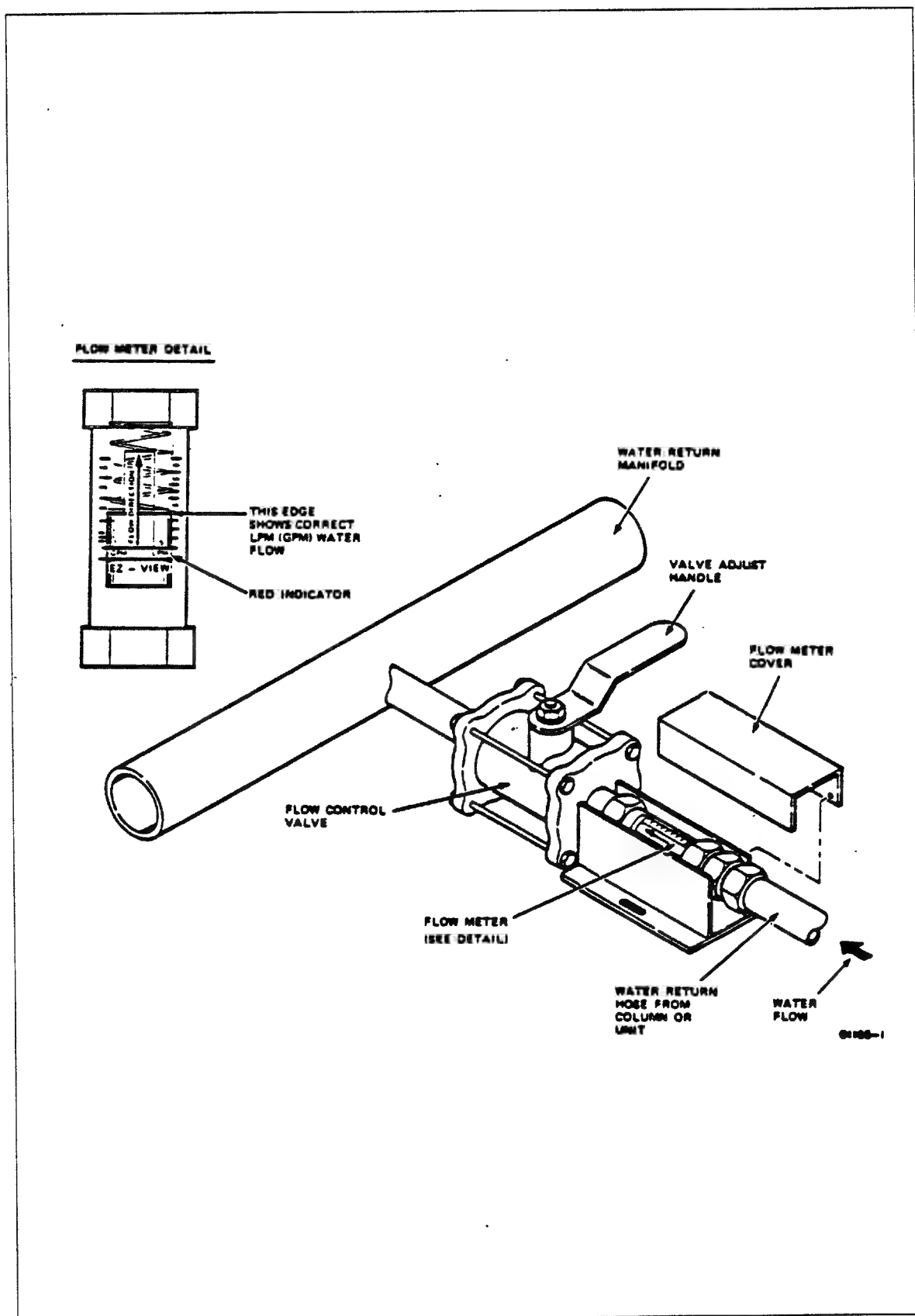


Figure 6-26. Water Flow Meters and Adjust Handles

- ___ 5. Check PUMP OUTLET PRESSURE gauge on water cooling unit to ensure that it reads between 75 and 92 psi for 60 Hz units or 40 to 60 psi for 50 Hz units. To obtain this reading, adjust bypass valve on water cooling unit.
- ___ 6. Repeat steps 3, 4, and 5 until all flow rates are adjusted correctly.
- ___ 7. Do not install flow meter covers until later.
- ___ 8. Visually check water level at water cooling unit sight glass.
 - If water level in sight glass does not indicate three-fourths full, proceed to step 9.
 - If water level in sight glass indicates three-fourths full, proceed to step 10.
- ___ 9. Use funnel to add distilled water to water tank, as necessary, until water level in sight glass indicates three-fourths full.
 - If water pump motor stops operating and HIGH WATER LEVEL indicator on power disconnect box lights, perform the following tasks:
 - ___ a. Set INPUT POWER DISCONNECT switch on rear of water cooling unit to OFF.
 - ___ b. Attach drain hose to water tank drain valve. Place opposite end of drain hose in an empty water container.
 - ___ c. Open water tank drain valve and drain water into container until sight glass indicates three-fourths full.
 - ___ d. Close drain valve.
 - ___ e. Set INPUT POWER DISCONNECT switch to ON.
 - ___ f. Repeat steps 3 and 7 until water level in sight glass remains at three-fourths full.
 - ___ g. Remove drain hose and container.
- ___ 10. Install floor tiles.

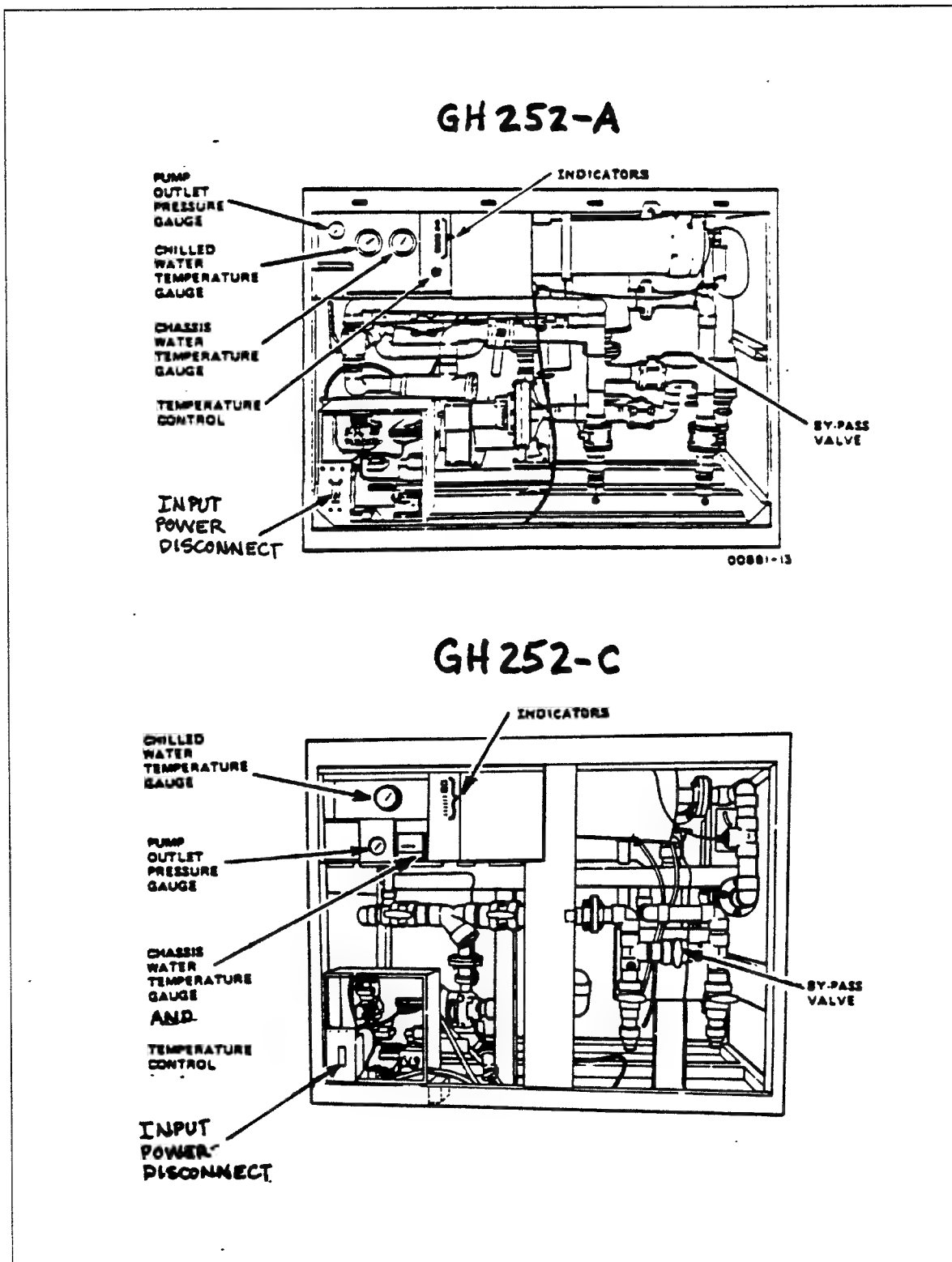


Figure 6-27. WCU Gauges and Indicators

Check GH252-A/-C WCU Temperature, Pressure, and Flow

Use this procedure to verify that the water cooling unit temperature, pressure, and flow rate are within specifications. Refer to figure 6-28.

Procedure prerequisites

- The water cooling unit must have been operating for a minimum of 15 min.

Procedure

1. Read PUMP OUTLET PRESSURE gauge. Adjust bypass valve, if necessary, to obtain following pressure:

	GH252-A	GH252-C
__ a. For 60-Hz power:	276-379 kPa (40-55 psi)	331-428 kPa (48-62 psi)
__ b. For 50-Hz power:	173-241 kPa (25-35 psi)	241-310 kPa (35-45 psi)

2. Read CHASSIS WATER TEMPERATURE gauge. Verify gauge indicates between 16.7°C and 21.5°C (62°F and 65°F), 18.3°C (63°F) nominal. If gauge does not indicate a temperature within this range, turn TEMPERATURE CONTROL knob counterclockwise to decrease temperature or clockwise to increase temperature. Wait 15 min for temperature change to register accurately on gauge.
3. Read CHILLED WATER TEMPERATURE gauge. Verify that gauge indicates between 4.4°C and 10.0°C (40°F and 50°F).

NOTE

The following step is necessary because of interaction between the pump pressure and the water flow rates.

4. Repeat this and previous procedure until water cooling unit temperature, pressure, and flow gauge readings are correct.

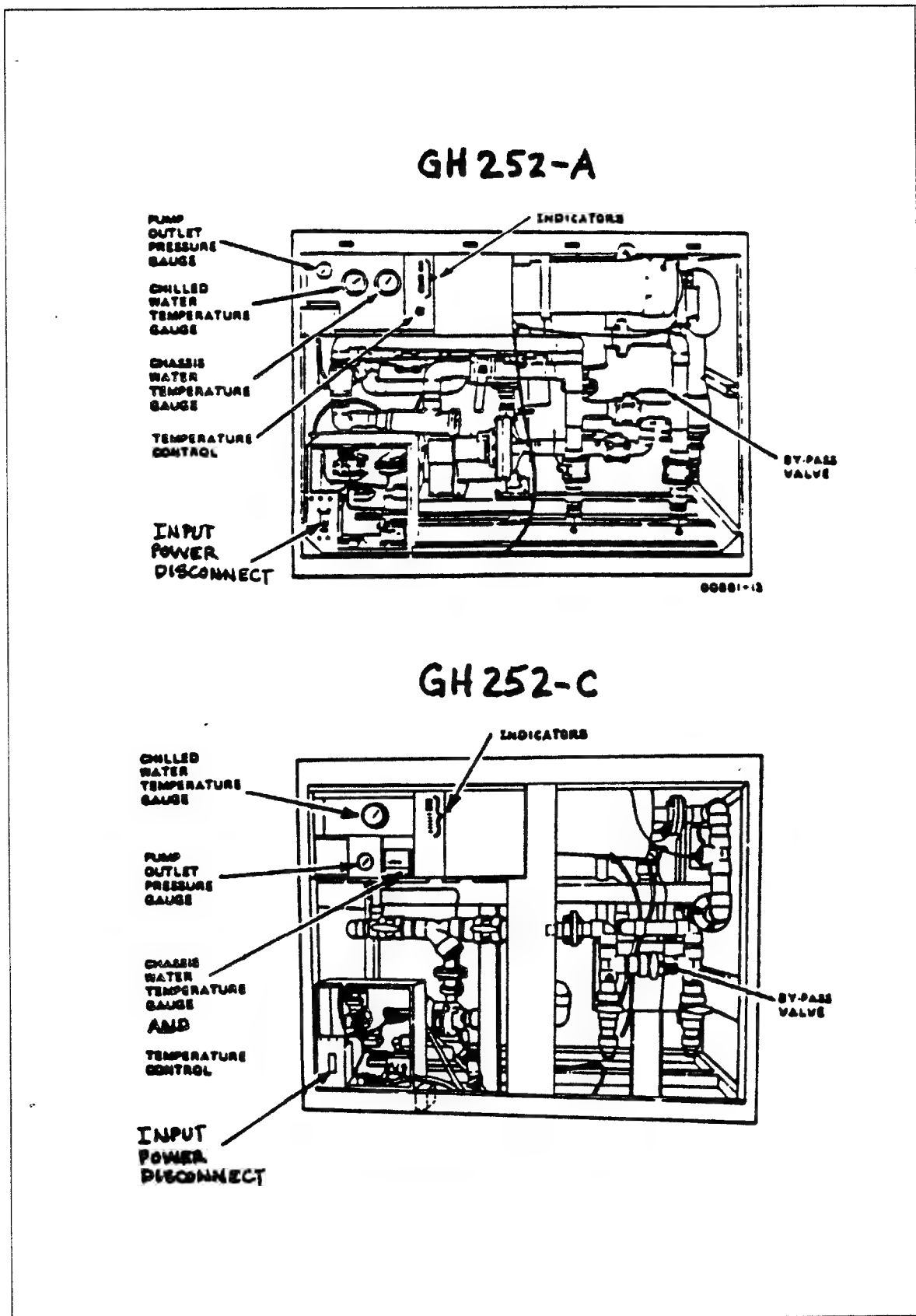


Figure 6-28. GH252-A/-C WCU Temperature, Pressure, and Flow Rate Meters

H2
ndg

→ GH252-A/-C Low Pressure Switch Adjustment

Use this procedure to adjust the low pressure switch (S1). Refer to figure 6-29 or 6-30.

Procedure prerequisites

- Water cooling unit is operating and all other Prepare Water Cooling Unit procedures have been completed.

Tools/parts required

- Socket wrench set
- Slotted screwdriver
- Phillips screwdriver

Procedure

1. Remove front cover from water cooling unit.

WARNING

50/60-Hz power is present behind switch-box cover of GH252-A or -C pressure control assembly. Take necessary precautions to prevent personal injury.

2. Remove top screws and loosen bottom screws in switch-box cover of pressure control assembly and remove cover.
3. Loosen top mounting screw on switch enclosure and remove switch enclosure.
4. Use a socket wrench to turn set screw on S1 CCW approximately two turns.
5. Slowly close pump inlet valve until PUMP OUTLET PRESSURE gauge indicates 173 kPa (25 psi).
6. Allow pressure to stabilize.
7. Slowly adjust set screw CW until switch trips.
8. Fully open pump inlet valve.
9. Replace switch enclosure and switch box cover.

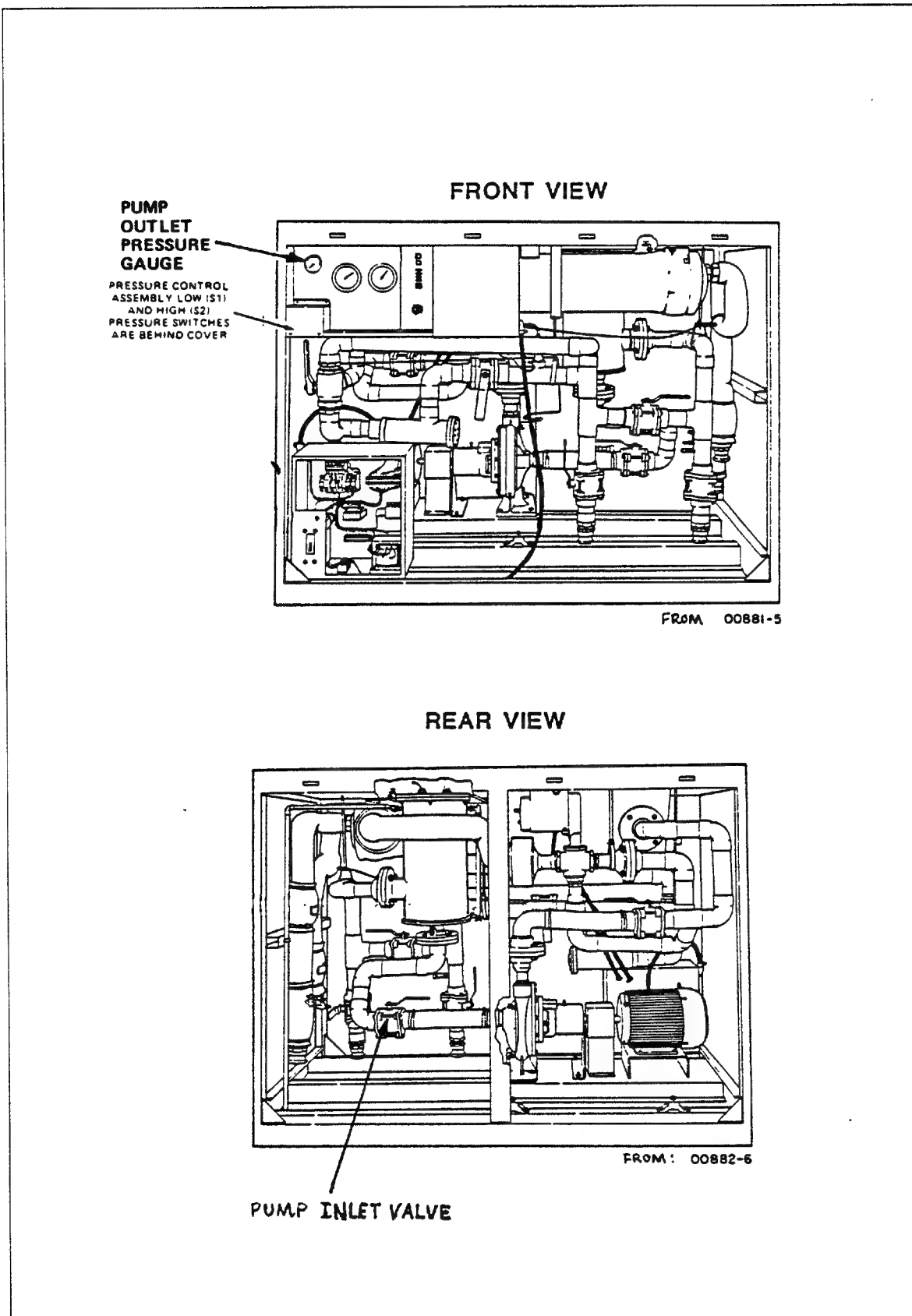


Figure 6-29. GH252-A Low Pressure Switch Adjustment

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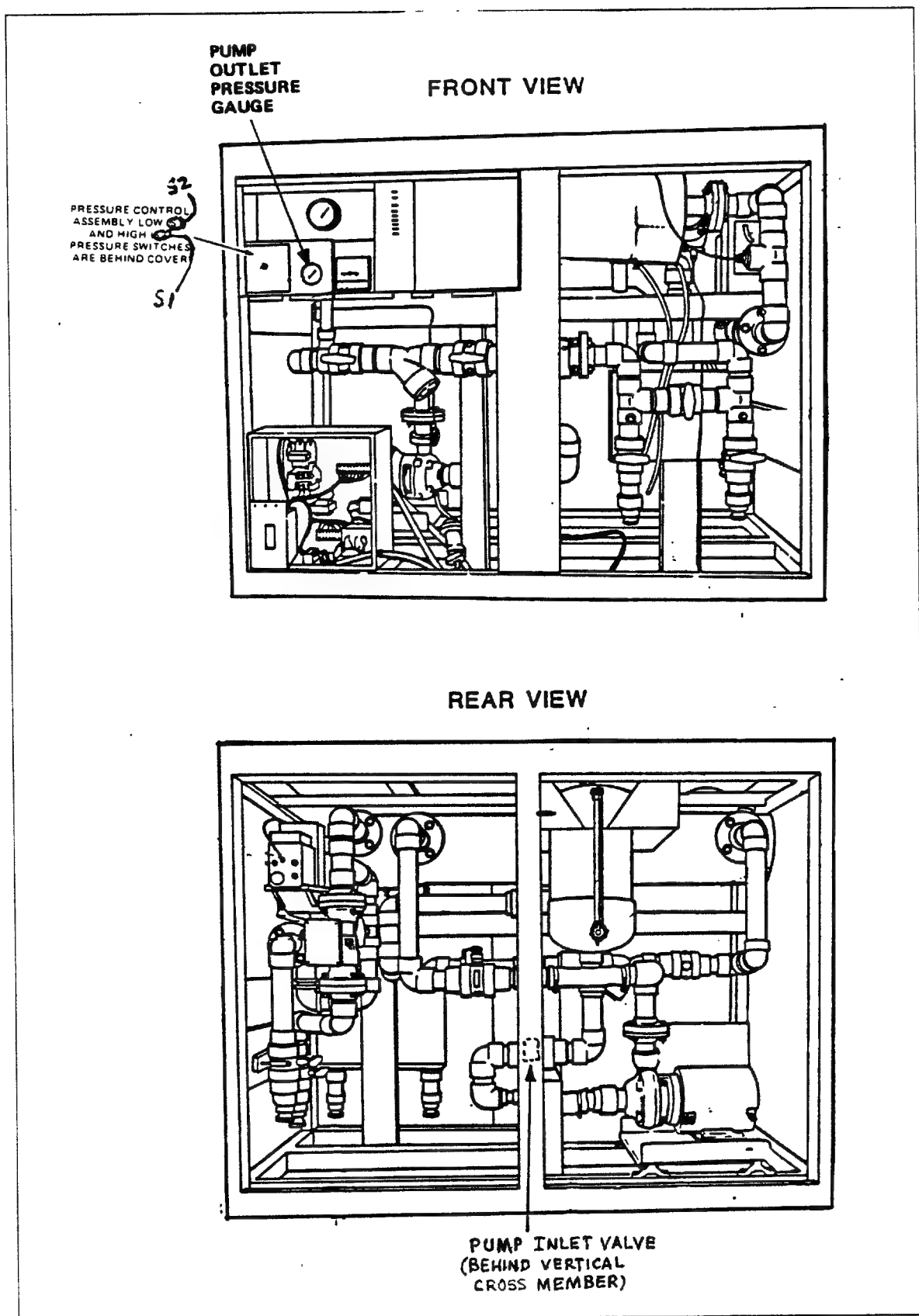


Figure 6-30. GH252-C Low Pressure Switch Adjustment

H2 hdg

GH252-A/-C High Pressure Switch Adjustment

Use this procedure to adjust the high pressure switch in the GH252-A or GH252-C. Refer to figure 6-31 or 6-32.

Procedure prerequisites

- Water cooling unit is operating and all other Prepare Water Cooling Unit procedures have been completed.

Tools/parts required

- Slotted screwdriver
- Phillips screwdriver
- Socket wrench set

Procedure

1. Remove front cover from water cooling unit.

WARNING

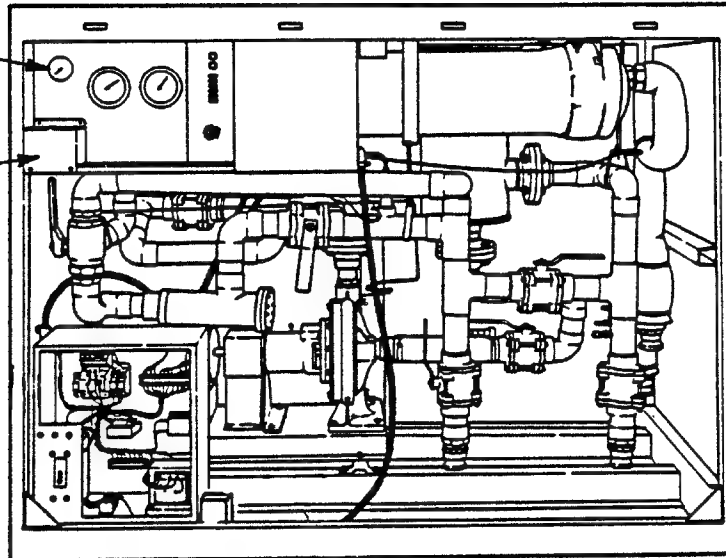
50/60-Hz power is present behind switch-box cover of GH252-A or -C pressure control assembly. Take necessary precautions to prevent personal injury.

2. Remove top screws and loosen bottom screws in switch-box cover of pressure control assembly and remove cover.
3. Use a slotted screwdriver to turn screw on S2 (S1 on GH252-C) CW approximately two turns to OFF.
4. Slowly close pump outlet valve completely and allow pressure to stabilize.
5. Note reading of PUMP OUTLET PRESSURE gauge.
6. Slowly open pump outlet valve until reading of PUMP OUTLET PRESSURE gauge reads 14 kPa (2 psi) less than reading in step c.
7. Use slotted screwdriver to turn screw slowly CCW until High Pressure switch trips.
8. Replace switch box cover.
9. Fully open pump outlet valve.

FRONT VIEW

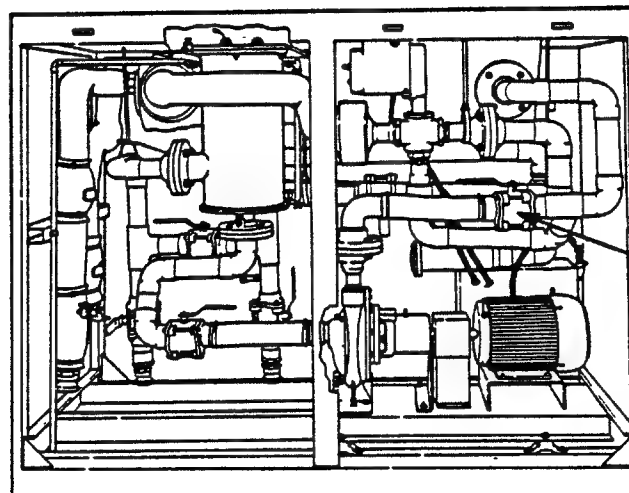
PUMP OUTLET
PRESSURE GAUGE

PRESSURE CONTROL
ASSEMBLY LOW (S1)
AND HIGH (S2) PRESSURE
SWITCHES ARE BEHIND
COVER.



FROM 00881-11

REAR VIEW



PUMP
OUTLET
VALVE

FROM 00882-8

Figure 6-31. GH252-A High Pressure Switch Adjustment

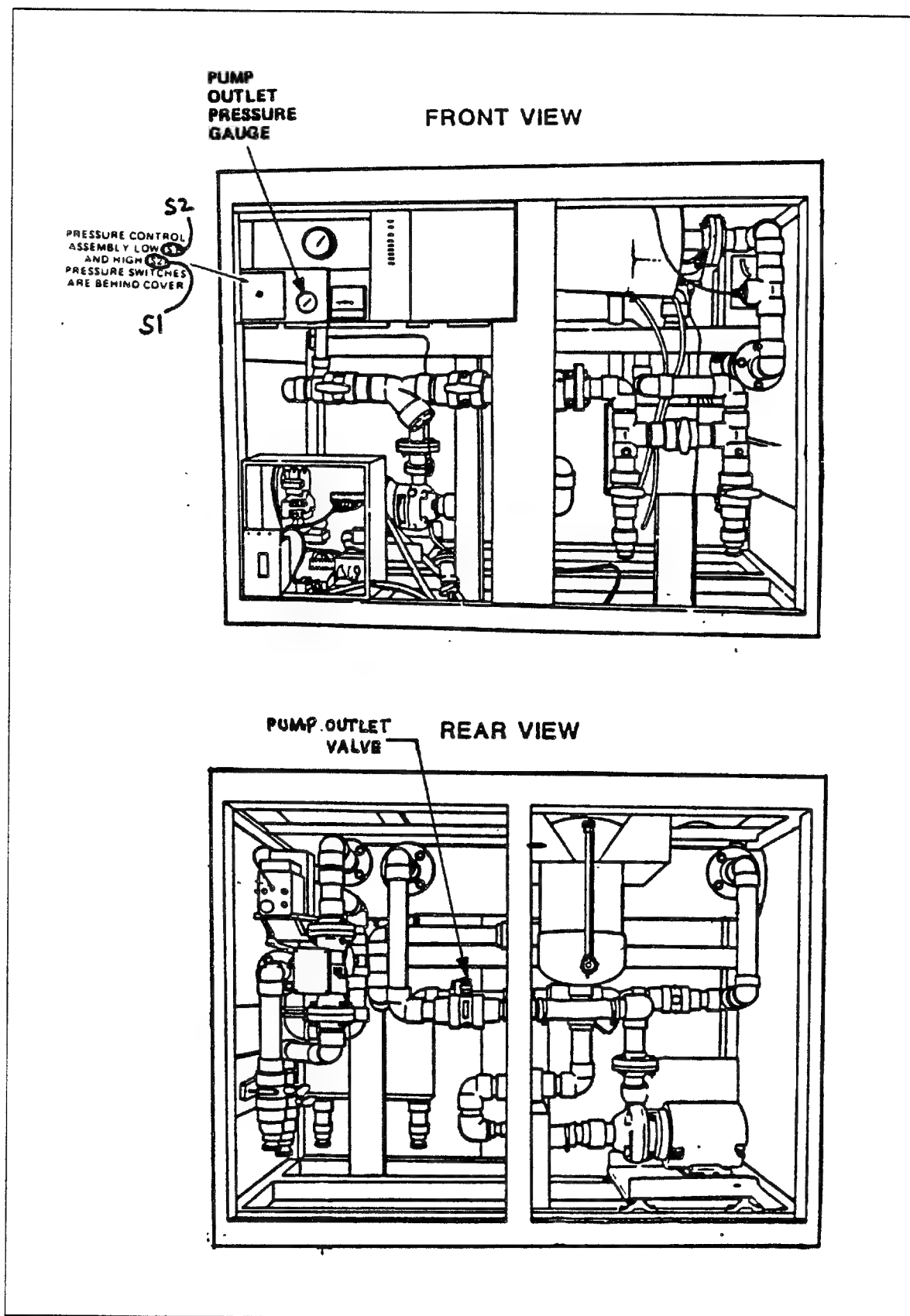


Figure 6-32. GH252-C High Pressure Switch Adjustment

Final Procedures

Final procedures to be performed on either the water cooling unit or the water flow processes in general consist of the following tasks:

- Check Site Water Flow Rates
- Bleed Air From CP
- Bleed Air From IOU
- Recheck Water Flow Rates
- Connect SPM Cables

Check Site Water Flow Rates

Use the following procedure to verify the correct water flow rates in the site supply lines to the water cooling units. Refer to figures 6-33 through 6-37.

Tools/parts required

- Differential pressure gauge
- 1/2-in wrench
- Water container, 2 L (1/2 gal)

Procedure

- 1. Prepare differential pressure gauge for checking site flow rate as follows:
 - a. Place differential pressure gauge with dial face vertical.
 - b. Open high- and low-pressure vent valves. If gauge needle does not indicate 0, mechanically set gauge needle as follows:
 - 1) Remove three screws from gauge cover, using a slotted screwdriver.
 - 2) Remove gauge cover and glass assembly.
 - 3) Hold zero adjustment screw in center of pointer with slotted screwdriver while turning pointer to 0 on gauge dial.
 - 4) Replace cover, glass assembly, and mounting screws.
 - c. Close high- and low-pressure vent valves.
 - d. Open bypass valve by turning it counterclockwise.
 - e. Close high- and low-pressure block valves by turning them clockwise.
 - f. Attach hoses provided with differential pressure gauge to high- and low-pressure hose taps on gauge. Tighten hoses with 1/2-in wrench.
- 2. Check site water flow rate as follows:
 - a. Check access venturi flow meter which is located on the site water return line inside the water cooling unit.

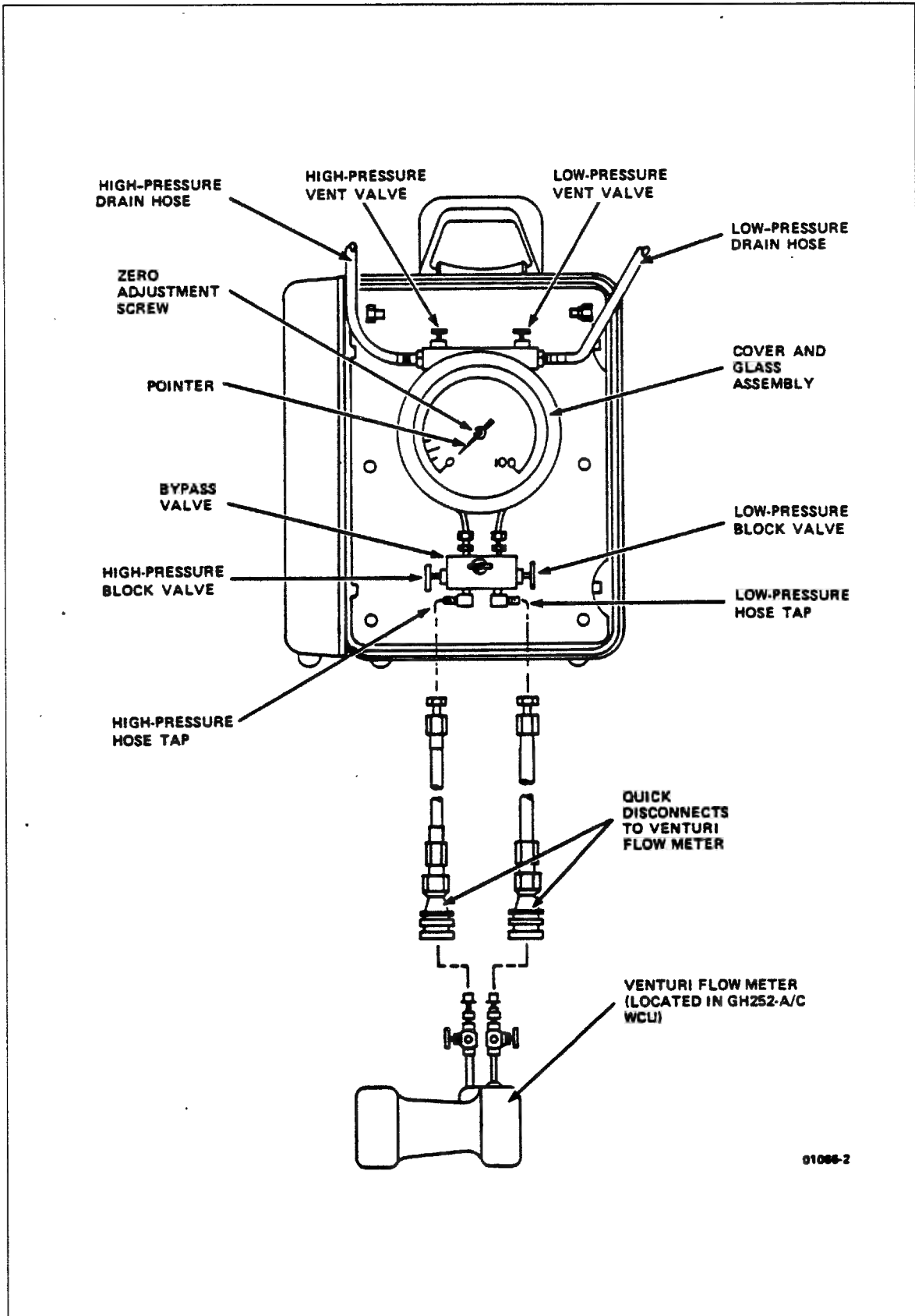


Figure 6-33. Differential Pressure Gauge

- ___ b. Ensure that venturi valves are closed (turned clockwise).

CAUTION

Hoses must be correctly connected between differential pressure gauge and venturi flow meter to prevent damage to gauge.

- ___ c. Connect hoses on differential pressure gauge to quick disconnects on venturi flow meter according to color coding on hoses and venturi flow meter.
 - ___ d. Open valves on venturi flow meter so that water flows into differential pressure gauge.
 - ___ e. Place high- and low-pressure drain hoses in water container.
 - ___ f. Open high- and low-pressure block valves on differential pressure gauge.
 - ___ g. Partially open high- and low-pressure vent valves until draining water no longer contains air bubbles.
 - ___ h. Close high- and low-pressure vent and block valves; leave bypass valve open. If pointer indicates 0, continue with procedure. If pointer does not indicate 0, system contains trapped air. Alternately open high- and low-pressure block valves to relieve air and allow pointer to indicate 0.
 - ___ i. Open high- and low-pressure block valves.
 - ___ j. Close bypass valve.
- ___ 3. Read differential pressure gauge. Gauge indicates flow rate in inches of water.
 - ___ 4. Use calibration chart or chart connected to venturi flow meter to convert inches of water to gal/min as follows:
 - ___ a. Look at markings on venturi flow meter to determine flow meter type. For this WCU, the flow meter markings are 2" - 636.
 - ___ b. Refer to in OF WATER Δ P column at left of chart, and locate reading taken in step 3.
 - ___ c. Follow across chart to slanted line corresponding to flow meter type. The number directly below this point in bottom row on chart is flow rate in gal/min.

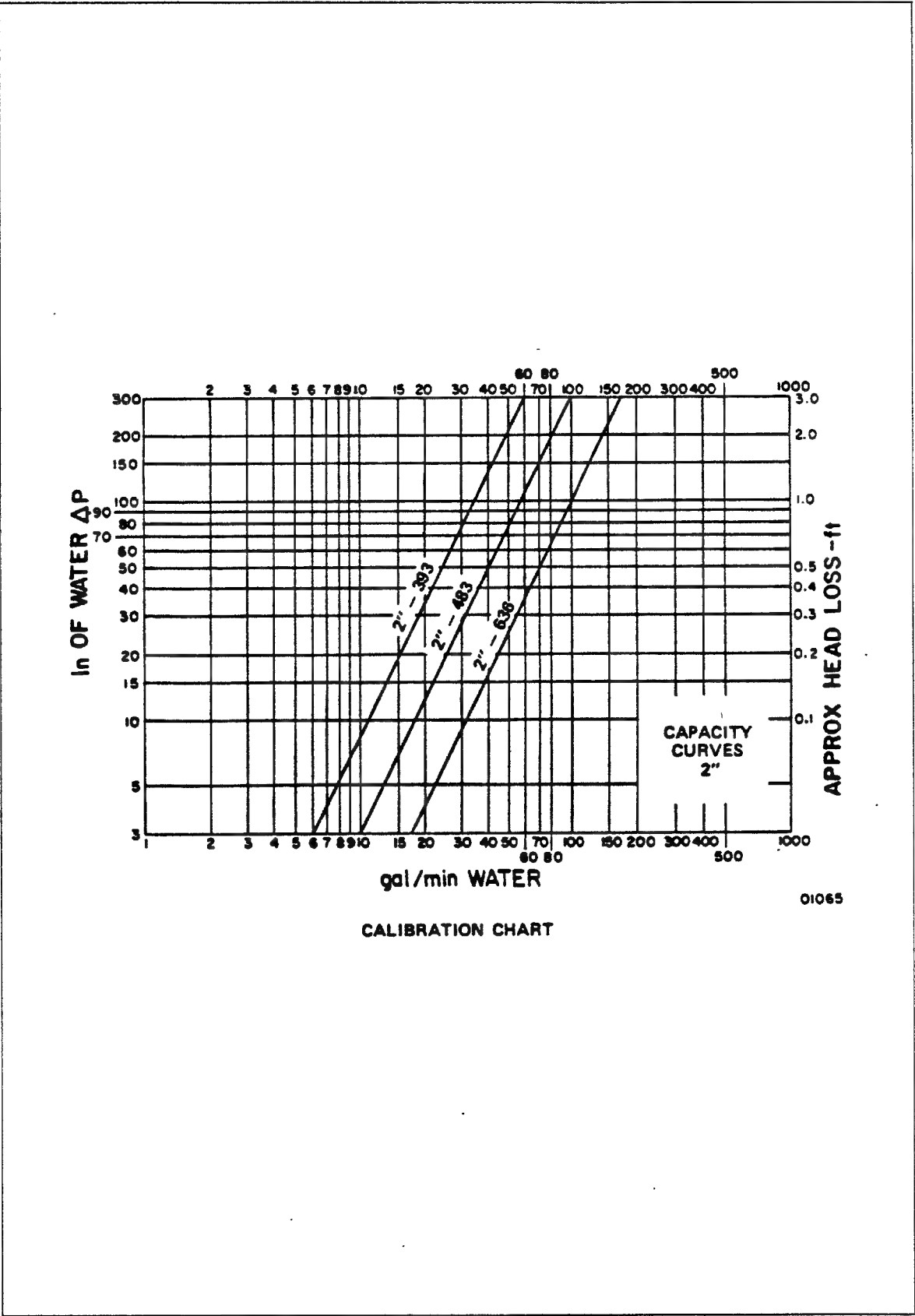


Figure 6-34. Water Flow Calibration Chart

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- 5. Observe reading on CHILLED WATER TEMPERATURE gauge on water cooling unit.
- 6. Use flow rate (determined in step 4) and chilled water temperature (read in step 5) with the chart to determine whether flow rate is within acceptable limits.
- 7. Adjust flow rate, if necessary, to obtain correct flow rate for water temperature by adjusting flow control valve on site water line within water cooling unit.
If flow rate cannot be properly adjusted, inform customer that site water needs flow/temperature correction.

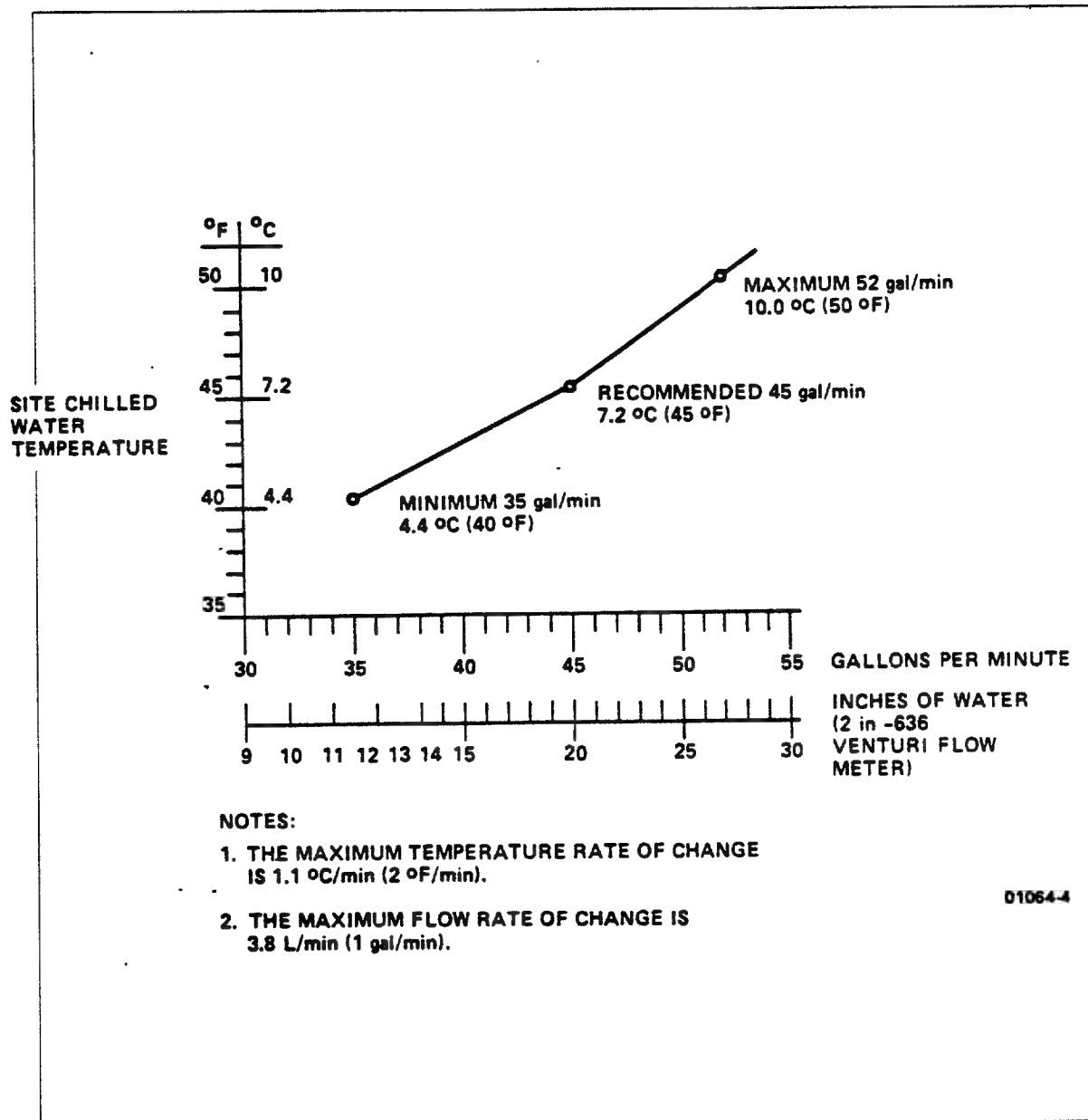


Figure 6-35. Site Water Flow Rate Chart

NOTE

The GH252-C WCU valve linkage housing does not have upper and lower operating limits.

- 8. Observe water mixing valve indicator on valve linkage housing assembly (GH252-A only) in water cooling unit. If indicator is not within upper and lower operating limits shown in figure, select following applicable procedure and perform its substeps.
 - If position of mixing valve indicator (GH252-A only) is higher than high limit shown in figure, perform these tasks:
 - a. Decrease site water flow slightly so that mixing valve indicator is positioned midway between OPEN and CLOSED on housing assembly. Do this by adjusting site water SUPPLY valve on water cooling unit.
 - b. Wait 30 min for water temperature to stabilize. Then observe water temperature gauge on water cooling unit. Adjust temperature control on water cooling unit, if necessary, to maintain a nominal 17.2°C (63°F) temperature.

NOTE

Note that a slight opening or closing of water cooling unit chassis bypass valve may help correct mixing valve indicator position. If this adjustment is made, all CP column flow rates must be checked and reset to their original values as follows:

- CP-0 and CP-1 column 1 flow meters to 11.4 L (3 gal) per min.
- CP-0 and CP-1 column 2 flow meters to 11.4 L (3 gal) per min.
- CP-0 and CP-1 column 3 flow meters to 15.1 L (4 gal) per min.
- CM flow meter to 7.6 L (2 gal) per min.
- IOU NIO cabinet flow meter to 15.1 L (4 gal) per min.
- IOU CIO cabinet flow meter to 15.1 L (4 gal) per min.
- c. Repeat these adjustments as necessary to position mixing valve indicator correctly.

NOTE

The GH252-C WCU valve linkage housing does not have upper and lower operating limits.

- If position of mixing valve indicator (GH252-A only) is lower than low limit shown in figure, perform the following tasks:
 - a. Increase site water flow slightly so that mixing valve indicator is positioned midway between OPEN and CLOSED on housing assembly. Do this by adjusting site water SUPPLY valve on water cooling unit.

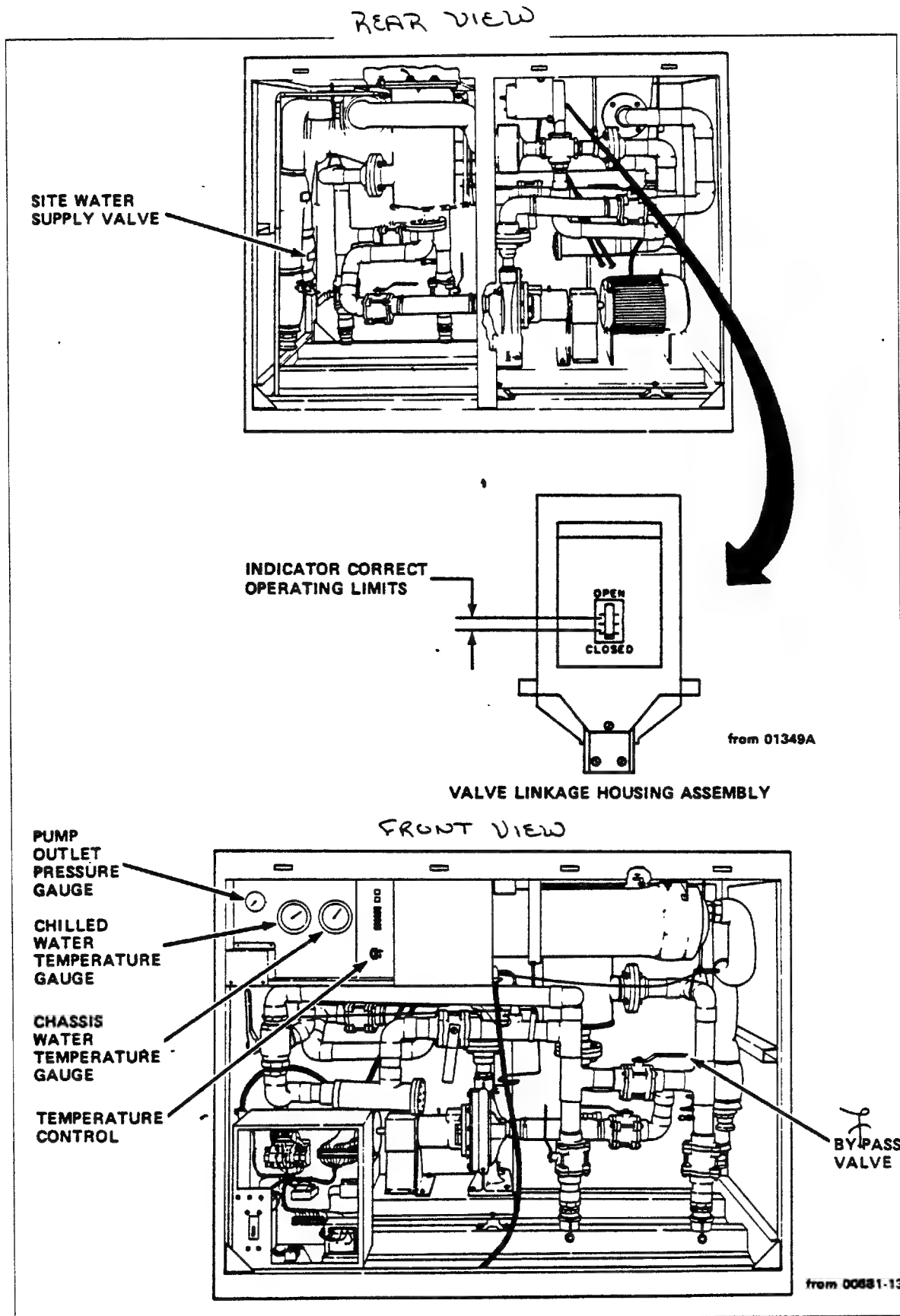


Figure 6-36. GH252-A WCU Mixing Valve Indicator

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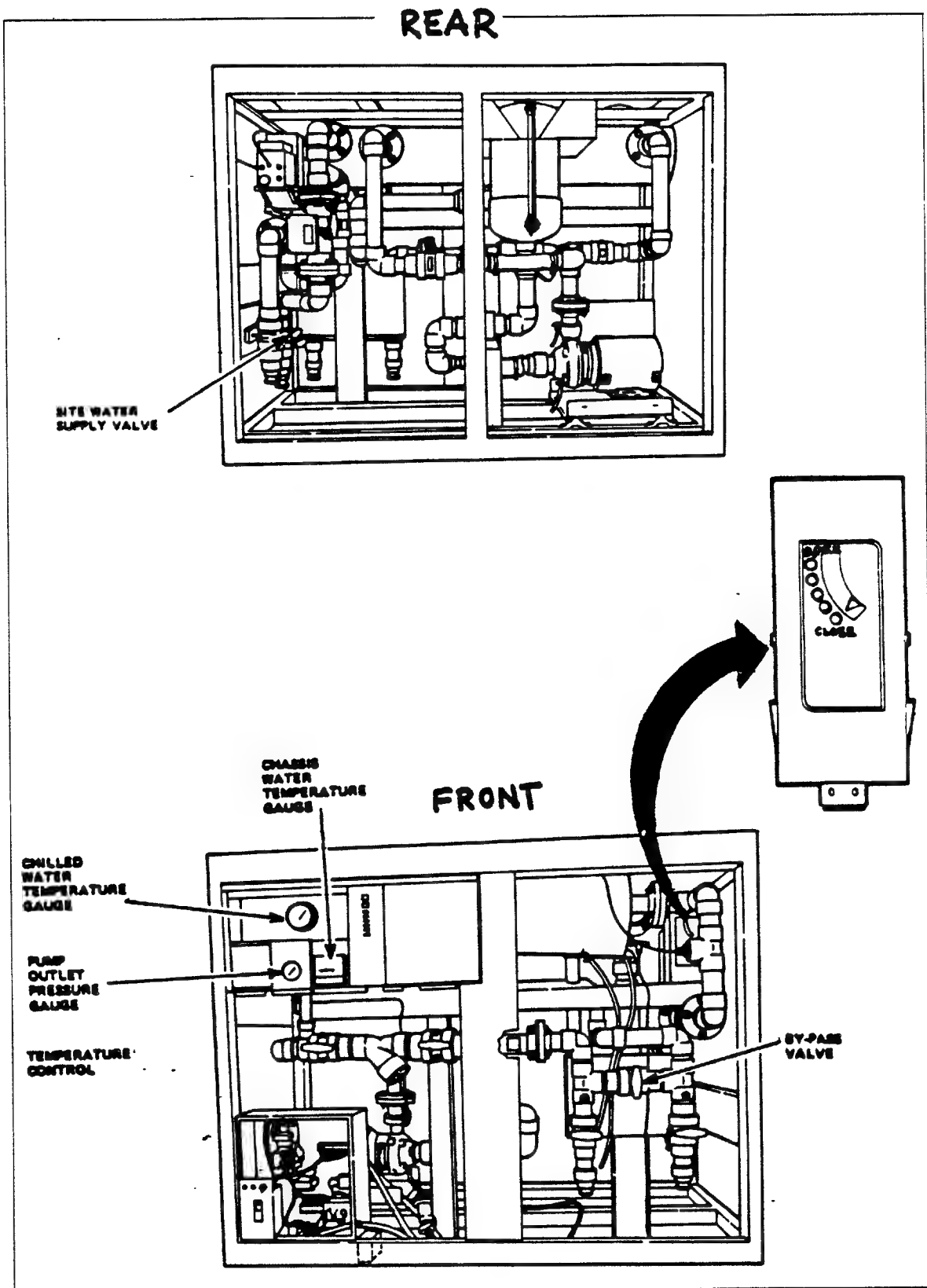


Figure 6-37. GH252-C WCU Mixing Valve Indicator.

- ___ b. Wait 30 min for water temperature to stabilize. Then observe water temperature gauge on water cooling unit. Adjust temperature control on water cooling unit, if necessary to maintain a nominal 17.2° (63°F) temperature.

NOTE

Note also that a slight opening or closing of water cooling unit chassis bypass valve may help obtain correct indicator position. If this adjustment is made, all CP column flow rates must be checked and reset to their original values as follows:

- CP-0 and CP-1 column 1 flow meters to 11.4 L (3 gal) per min.
 - CP-0 and CP-1 column 2 flow meters to 11.4 L (3 gal) per min.
 - CP-0 and CP-1 column 3 flow meters to 15.1 L (4 gal) per min.
 - CM flow meter to 7.6 L (2 gal) per min.
 - IOU NIO cabinet flow meter to 15.1 L (4 gal) per min.
 - IOU CIO cabinet flow meter to 15.1 L (4 gal) per min.
- ___ c. Repeat these adjustments as necessary to position mixing valve indicator correctly.
- If mixing valve indicator modulates (hunts) outside of limits, perform these tasks:

NOTE

Modulation of mixing valve within limits shown in figure is an acceptable condition.

- ___ a. Check customer-supplied site water for following requirements:
 - Maximum temperature rate of change is 1.1°C/min (2°/min), as observed on water cooling unit temperature gauge.
 - Maximum flow rate of change is 3.8 L/min (1 gal/min), as observed on differential pressure gauge.
- ___ b. If site water does not meet either or both of these conditions, request that customer make corrective adjustments.
- ___ c. When (and only when) both temperature and flow rates of site water are within requirements, continue with the following steps.

- ___ d. Open or close water cooling unit chassis bypass valve slightly, as required, to stop or limit modulation of mixing valve indicator. Following this adjustment, check all CP column flow rates and reset them to their original values as follows:
 - CP-0 and CP-1 column 1 flow meters to 11.4 L (3 gal) per min.
 - CP-0 and CP-1 column 2 flow meters to 11.4 L (3 gal) per min.
 - CP-0 and CP-1 column 3 flow meters to 15.1 L (4 gal) per min.
 - CM flow meter to 7.6 L (2 gal) per min.
 - IOU NIO cabinet flow meter to 15.1 L (4 gal) per min.
 - IOU CIO cabinet flow meter to 15.1 L (4 gal) per min.
 - ___ e. Wait 0.5 h for water temperature to stabilize. Then observe water temperature gauge on water cooling unit. Adjust temperature control on water cooling unit, if necessary, to maintain a nominal 17.2°C (63°F) temperature.
 - ___ f. Repeat these adjustments as necessary to position mixing valve indicator correctly.
- ___ 9. Open bypass valve on differential pressure gauge.
- ___ 10. Close venturi flow meter valves, and disconnect differential pressure gauge hoses from flow meter.
- ___ 11. Open high- and low-pressure vent valves on differential pressure gauge.

CAUTION

Drain water from gauge and hoses to prevent damage caused by freezing temperatures that may occur during transporting of gauge.

- ___ 12. Disconnect hoses from differential pressure gauge and venturi flow meter.
- ___ a. Hold high-pressure hose quick-disconnect end; let nut end dangle into water container.
 - ___ b. Use screwdriver or some other instrument to depress valve in center of quick disconnect to allow water to drain from hose.
 - ___ c. Repeat substeps a and b for low-pressure hose.

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- ___ 13. Close bypass valve.
- ___ 14. Place water container under high- and low-pressure hose taps.
- ___ 15. Open high-pressure vent valve.
- ___ 16. Blow into high-pressure drain hose to force water out at low-pressure hose tap.
- ___ 17. Open low-pressure vent valve.
- ___ 18. Blow into low-pressure drain hose to force water out at low-pressure hose tap.
- ___ 19. Install floor tiles, if removed.

Bleed Air From CP

Use this procedure to bleed trapped air from the CP-0 and CP-1 (if present) columns. Refer to figure 6-38.

NOTE

DOES A HIGH-TEMPERATURE CONDITION EXIST FOR CP-0 OR CP-1?

- *If yes, continue.*
 - *If no, go to next procedure.*
-

Procedure prerequisites

- The water cooling unit is operating.

Tools/parts required

- Paper tissues or towel for absorbing water
- Small screwdriver
- Water tank drain hose
- Empty water container to hold 4 L to 7.6 L (1 gal to 2 gal)

Procedure

- ___ 1. Unscrew and remove end cap from bleed valve at top of CP-0 column 1.
- ___ 2. Place a tissue or towel around valve to absorb bleed water in next step.
- ___ 3. Press compressible needle in center of valve with small tool, such as screwdriver, until air escapes and water bleeds from valve orifice. Release valve. Bleed valve is similar to an auto tire air valve.
- ___ 4. Add water to, or drain it from water cooling unit tank if following conditions exist.
 - Water level in sight glass does not indicate three-fourths full.
 - Water pump motor stops operating while bleeding air, and LOW WATER LEVEL indicator on power disconnect box lights.
 - ___ a. Set INPUT POWER DISCONNECT switch on water cooling unit to OFF.
 - ___ b. Add water, and restart pump motor.
 - Water pump motor stops operating, and HIGH WATER LEVEL indicator on power disconnect box lights. If this condition exists, perform the following steps:
 - ___ a. Set INPUT POWER DISCONNECT switch on water cooling unit to OFF.
 - ___ b. Attach drain hose to water tank drain valve, and place hose in empty water container.

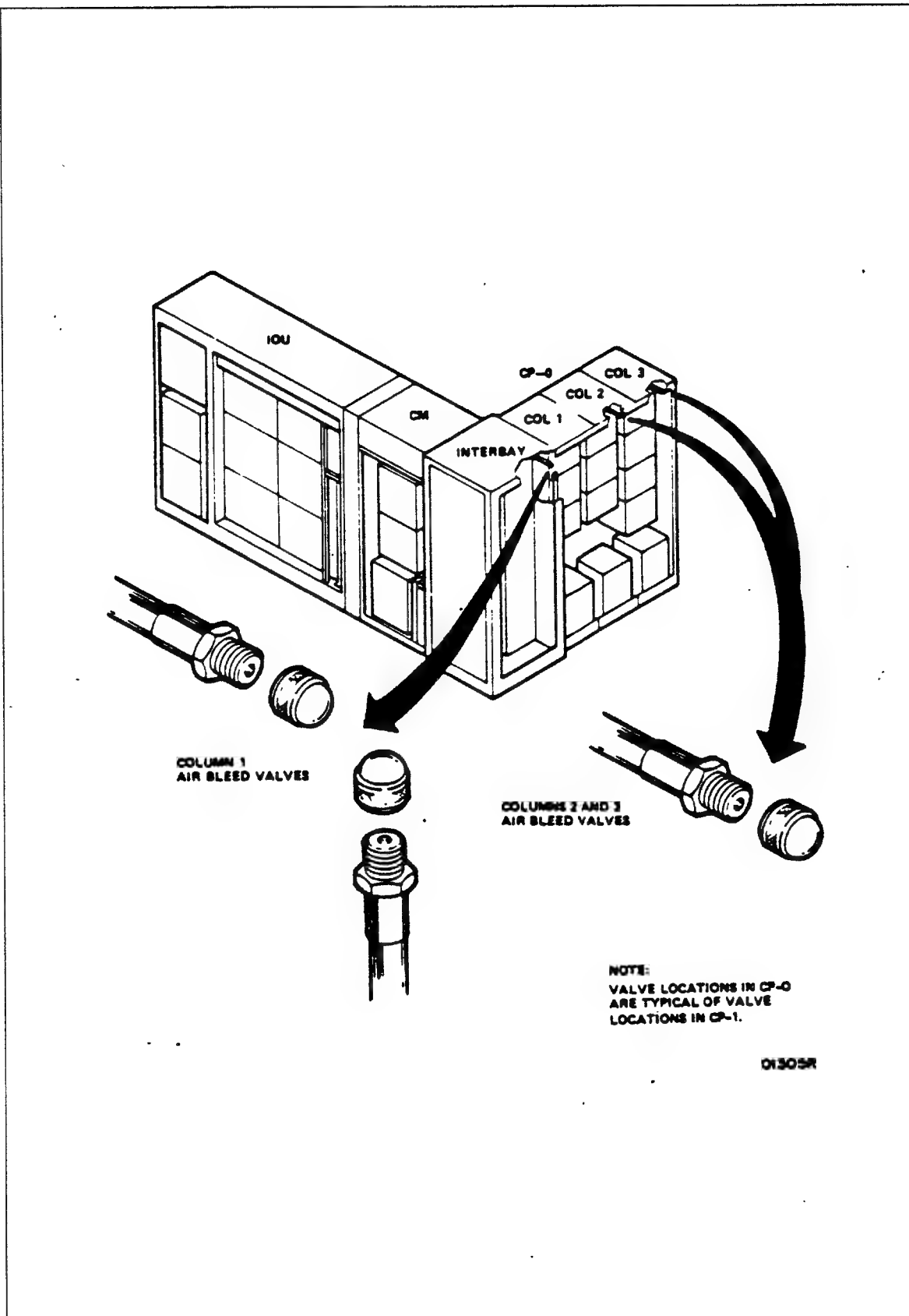


Figure 6-38. CP Columns Air Bleed Valve Locations

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- ___ c. Open water tank drain valve, and drain water into container until sight glass indicates three-fourths full.
- ___ d. Close drain valve. Remove drain hose and container.
- ___ e. Restart pump motor.
- ___ 5. Repeat steps 1 through 4 for CP-0 column 2.
- ___ 6. Repeat steps 1 through 4 for CP-0 column 3.
- ___ 7. Repeat procedure for optional CP-1.

Bleed Air From IOU

Use this procedure to bleed air from the IOU. Refer to figure 6-39.

- ___ 1. Hold paper tissues or towel under bleed valve in NIO section of IOU.
- ___ 2. Open valve slowly and allow air to escape. When water begins to escape, shut valve.
- ___ 3. Remove paper tissues or towel.
- ___ 4. Add water, as necessary, to maintain water level at three-fourths full in sight glass.
 - If water pump motor stops operating while bleeding air, and LOW WATER LEVEL indicator on power disconnect box lights:
 - a. Set INPUT POWER DISCONNECT switch on water cooling unit to OFF.
 - b. Add water and restart pump motor.
 - If water pump motor stops operating and HIGH WATER LEVEL indicator on power disconnect box lights:
 - ___ a. Set INPUT POWER DISCONNECT switch on water cooling unit to OFF.
 - ___ b. Attach drain hose to water tank drain valve and place hose in empty water container.
 - ___ c. Open water tank drain valve and drain water into container until sight glass indicates three-fourths full.
 - ___ d. Close drain valve.
 - ___ e. Remove drain hose and container.
 - ___ f. Restart pump motor.
- ___ 5. Repeat this procedure for optional IOU CIO and CM cabinets.

NOTE

Some units have more than one bleed valve location. See figure.

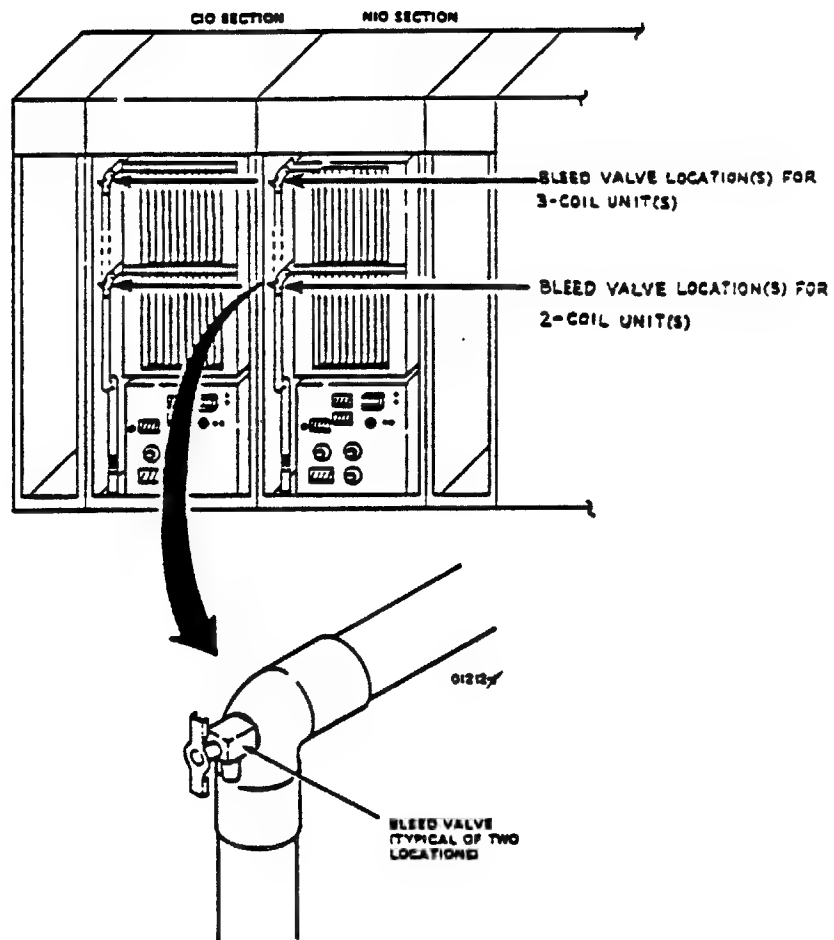


Figure 6-39. IOU ^{NIO} Air Bleed Valve Locations
^

Recheck Water Flow Rates

Use this procedure to recheck the initial settings of the water flow rates through the CM, CP, and IOU columns. This recheck is necessary after stabilization of the water flow through the system. Refer to figure 6-40.

Procedure prerequisites

- All previous procedures in this chapter have been completed and the WCU is operating properly.

Procedure

- 1. Check to ensure that water flow meters on under-floor water manifolds have following flow rates:
 - a. IOU NIO cabinet, 15.1 L (4 gal) per min.
 - b. IOU CIO cabinet, 15.1 L (4 gal) per min.
 - c. CM cabinet, 7.6 L (2 gal) per min.
 - d. CP-0 and CP-1 (if present) column 1 cabinets, 11.4 L (3 gal) per min.
 - e. CP-0 and CP-1 (if present) column 2 cabinets 11.4 L (3 gal) per min.
 - f. CP-0 and CP-1 (if present) column 3 cabinets 15.1 L (4 gal) per min.
 - g. Adjust control valves as necessary to correct water flow rates.
- 2. Install all covers on flow meters.
- 3. Check water cooling unit for following gauge readings:

	GH252-A	GH252-C
— a. For 60-Hz power:	276-379 kPa (40-55 psi)	331-428 kPa (48-62 psi)
— b. For 50-Hz power:	173-241 kPa (25-35 psi)	241-310 kPa (35-45 psi)

- 4. CHASSIS WATER TEMPERATURE gauge has a reading of 16.7°C to 18.3°C (62°F to 65°F).
- 5. CHILLED WATER TEMPERATURE gauge has a reading of 4.4°C to 10.0°C (40°F to 50°F).

Make any necessary adjustments to obtain correct pressure and temperature. These adjustments are described in an earlier procedure in this section, Check Water Cooling Temperature.

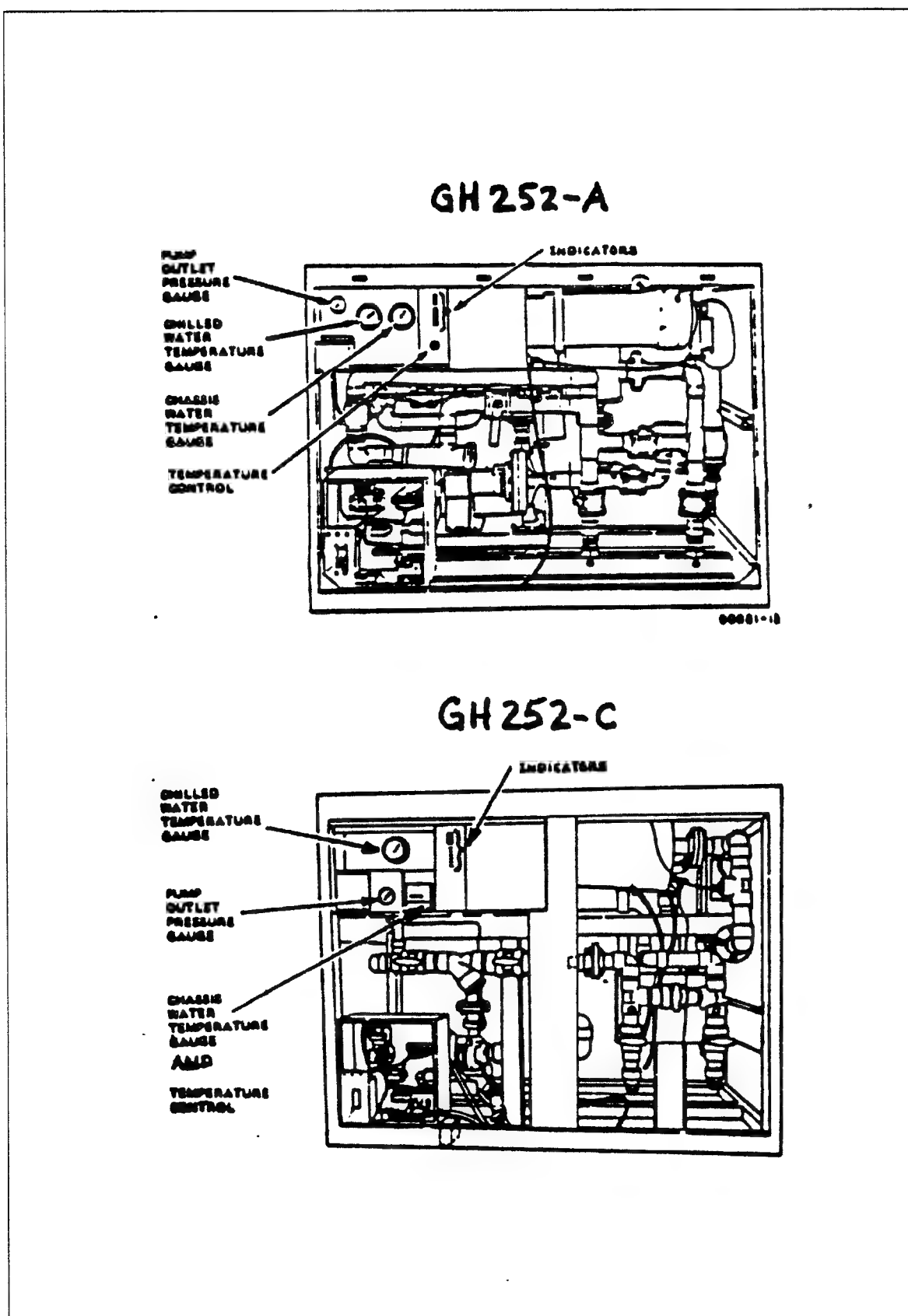


Figure 6-40. GH252-A/-C WCU Temperature, Pressure, and Flow Rate Meters

Connect SPM Cables

Use this procedure to connect the status and control cables from the system power monitor (SPM) to the water cooling unit. Refer to figures 6-41 and 6-42.

Procedure

- 1. Route the status and control cables under the raised floor between the SPM and the floor cutouts for the water cooling unit.
- 2. Remove cover from connector box on GH252-A water cooling unit.
- 3. Locate cable (tagged CHILLER J1 and CHILLER 1) under raised floor from SPM J2. Remove floor tiles as necessary to locate cable.
- 4. Pull cable up through cable cutout in floor and into bottom of water cooling unit.
- 5. Connect J2 cable from SPM to J1 in water cooling unit.
- 6. Install cover on connector box in water cooling unit.
- 7. Install cover plate on power distribution box, if cover is off.
- 8. Install floor tiles.

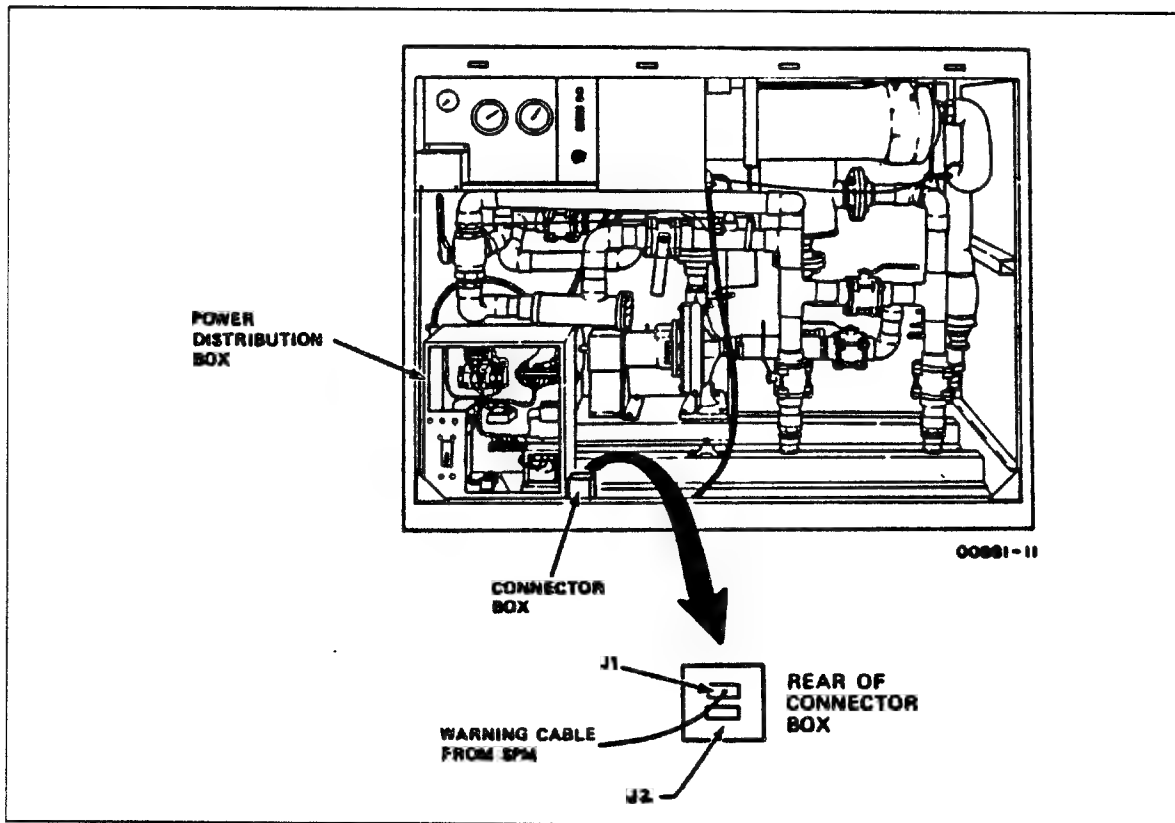


Figure 6-41. GH252-A WCU Connector Box For SPM Cable

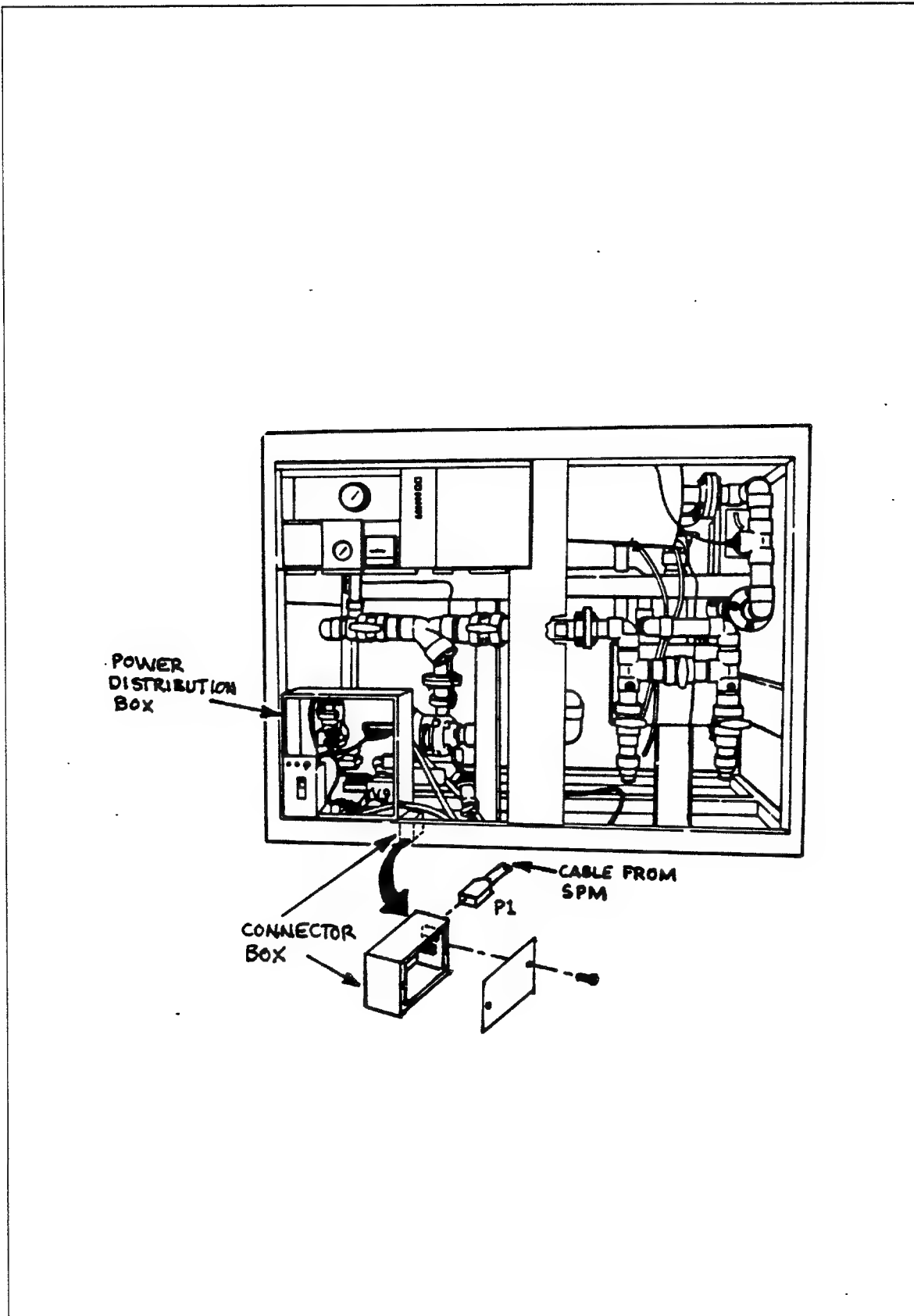


Figure 6-42. GH252-C WCU Connector Box For SPM Cable

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Channel Options Installation

7

IOU CIO Channel Removal	7-2
IOU CIO Channel Installation	7-6

Channel Options Installation

7

This section contains procedures for installing I/O channel options in the IOU CIO cabinet. They are as follows:

- AT497-A Intelligent Peripheral Interface (IPI) Direct Memory Access I/O channel
- AT490-A Intelligent Standard Interface (ISI) Direct Memory Access I/O channel
- AT498-A CYBER 170 Direct Memory Access (170 DMA) Enhanced 170 channel

IOU CIO Channel Removal

Use this procedure to remove an ISI, IPI, or DMA-enhanced 170 channel.

Each I/O channel in the IOU CIO consists of three plug-in boards and a channel cable assembly. Two of the three plug-in boards and the channel cable assembly are changed when removing an I/O channel. Refer to figure 7-1.

Procedure prerequisites

- I/O cables are disconnected from channel to be replaced

Tools/parts required

- Antistatic wrist strap
- Antistatic bag for boards
- 1/4-in nutdriver, or
- Torx screwdriver
- Diagonal cutters

Procedure

- 1. Set MAIN DISCONNECT circuit breakers on IOU NIO and CIO power distribution boxes to OFF.
- 2. Connect antistatic wrist strap to wrist and to frame ground.
- 3. Locate channel cables to be removed on back of channel cable connector panel.
- 4. Trace cables to Berg connectors on IOU CIO backpanel, cutting cable ties as necessary.
- 5. Unplug both channel cable Berg connectors from backpanel and route cables back to rear of channel cable connector panel.

NOTE

DMA-enhanced 170 channels use only one connector plate (A) per channel.

- 6. Locate both A and B connector plates (see figure) on front of channel cable connector panel.

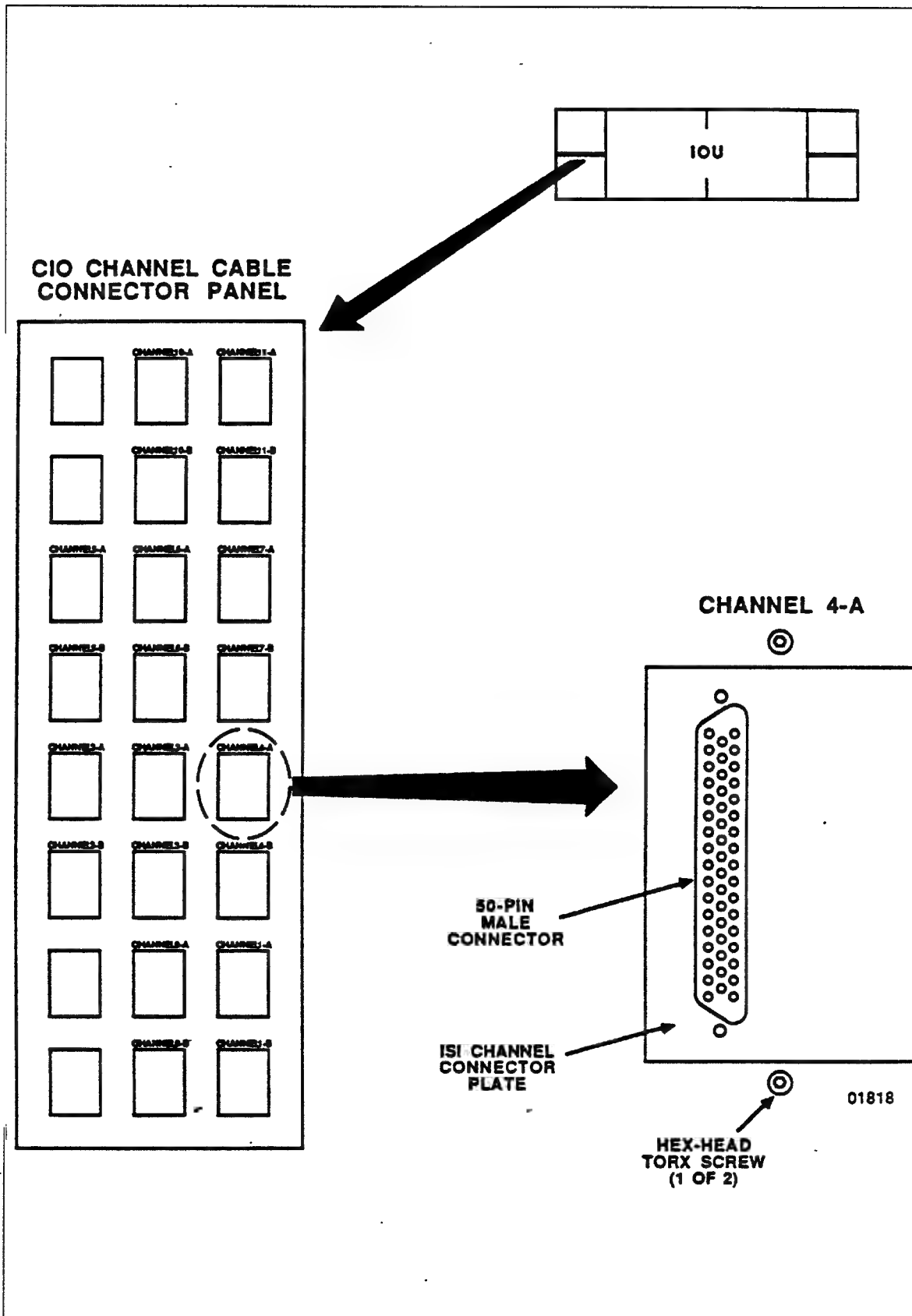


Figure 7-1. Channel Cable Connector Panel and ISI/IPI Channel Connector Plate

NOTE

Channel connector plate retaining screws can be removed with either a 1/4-in nutdriver or a Torx screwdriver.

- ___ 7. Remove two retaining screws from A and B connector plates.
- ___ 8. Remove and coil channel cables assembly and set aside for return to factory.

NOTE

All IOU channels use boards Z, Y, and X. Only the Z and X boards are changed during removal and installation. Note that all channel types use 1JYH boards.

IOU CIO channels use the following boards:

DMA-170		
ISI	IPI	
1JZH	1LZH	1KZH
1JYH	1JYH	1JYH
1JXH	1LXH	1KXH

- ___ 9. Locate Z and X boards for channel to be removed (figure 7-2).
- ___ 10. Pull top and bottom extractors outward at same time on front of Z board for channel. This unseats board from rear edgeboard connector.
- ___ 11. Remove board by sliding it straight out of cabinet. Place board in antistatic bag and set aside for later return to factory.
- ___ 12. Repeat steps 8, 9, and 10 with X board.

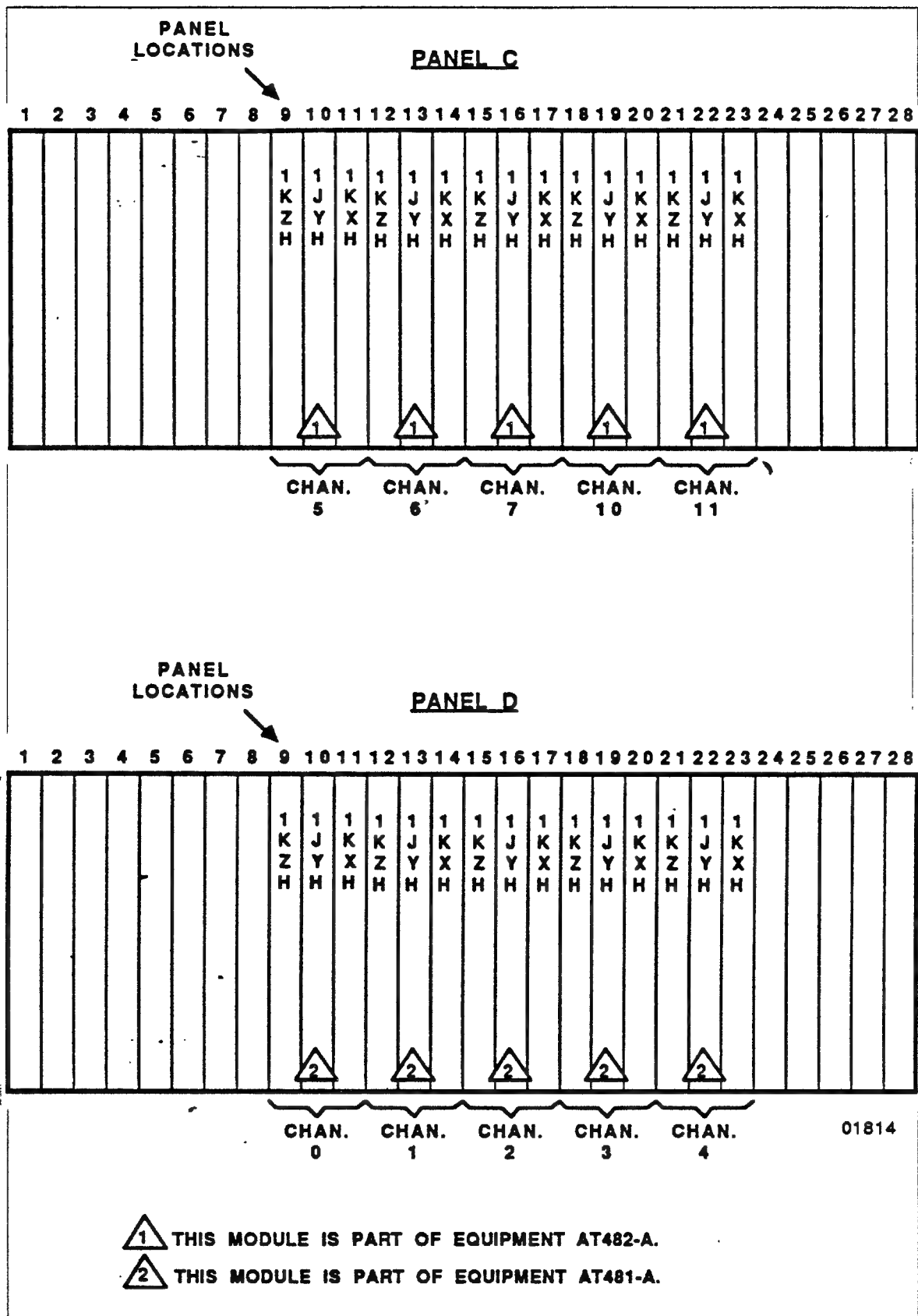


Figure 7-2. IOU CIO Panel Map

IOU CIO Channel Installation

Use this procedure to install an ISI, IPI, or DMA-enhanced 170 channel.

Each I/O channel in the IOU CIO consists of three plug-in boards and a channel cable assembly. Two of the three boards and the channel cable assembly are changed when installing an I/O channel that replaces a previous channel. All three boards and the channel cable assembly are installed for a new channel. Refer to figure 7-3.

Tools/parts required

- Static-free smock
- Antistatic wrist strap
- 1/4-in nutdriver, or
- Torx screwdriver
- Board insertion tool

Procedure

- 1. Set MAIN DISCONNECT circuit breakers on all IOU NIO and CIO power distribution boxes to OFF.
- 2. Connect antistatic wrist strap to your wrist and to frame ground.

NOTE

IS CHANNEL TO BE INSTALLED A DMA-ENHANCED 170?

- *If yes, go to step 3.*
 - *If no, go to next question.*
-

NOTE

Adapter plates for channels 5_g through 11_g are factory installed.

- 3. If an ISI or IPI channel was removed before installation, perform the following substeps, otherwise skip to step 4.
 - a. Locate 170 adapter plates in installation kit.
 - b. Mount 170 adapter plates to applicable channel A and B cut-outs (see figure) in channel cable connector panel, using retaining screws removed during removal procedure.
- 4. Install DMA-enhanced 170 channel cable connector plate to adapter plate in A cut-out using retaining screws supplied with cable.

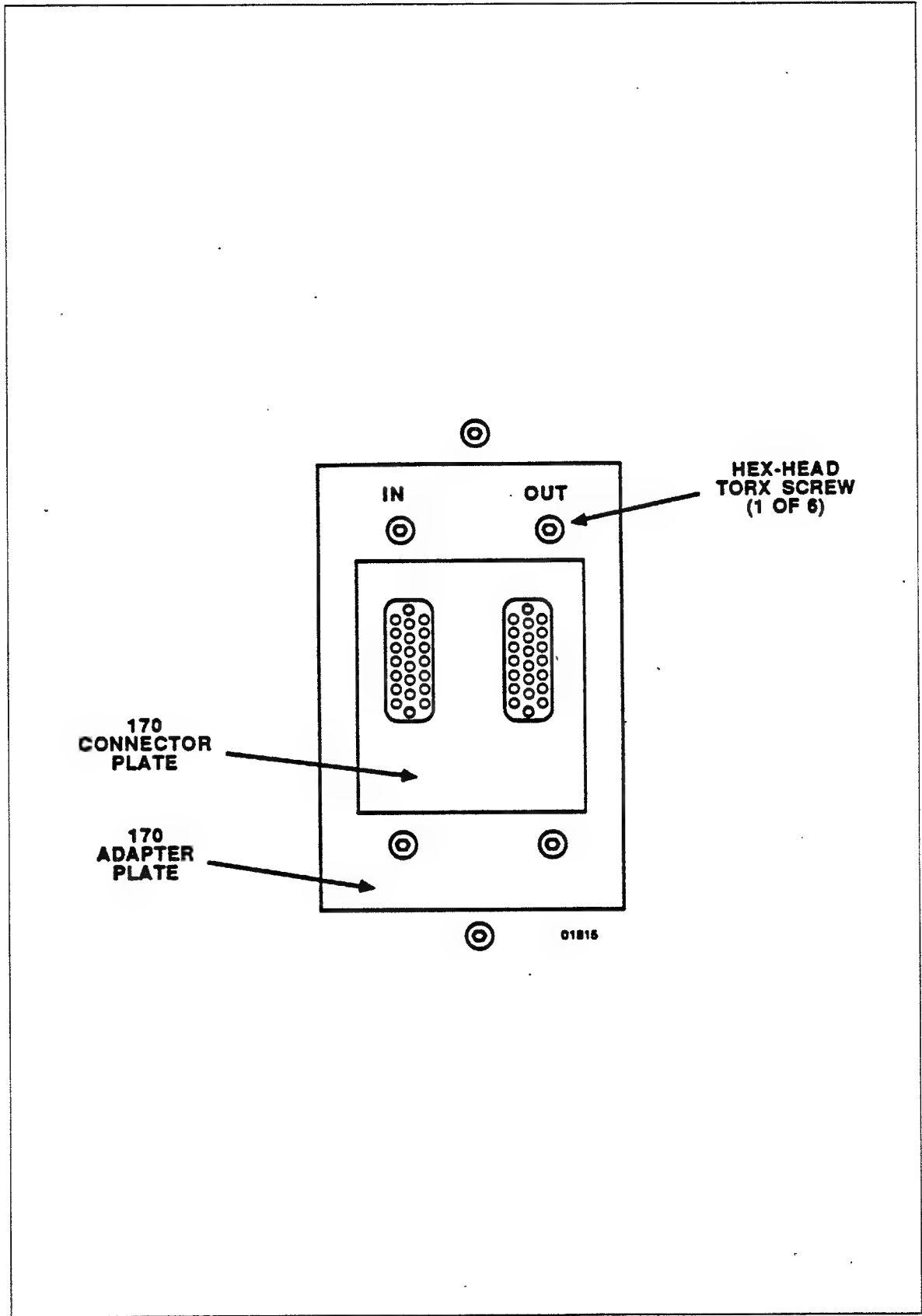


Figure 7-3. 170 Channel Adapter Plate

- ___ 5. Route channel cables to backpanel and install Berg connectors as follows:
 - ___ a. Position A Berg connector so dotted edge is down.
 - ___ b. Plug A Berg connector on to backpanel pins row AD of channel location determined by figure 7-4. Top of connector plugs on to pin 9.
 - ___ c. Position B Berg connector so dotted edge is up.
 - ___ d. Plug B Berg connector on to backpanel pins rows CB of channel location determined by figure. Top of connector plugs on to pin 9.
 - ___ e. Ensure that no female contacts back out of connectors as connectors are pushed on to backpanel pins. If contact backs out of connector, remove connector, reseal contact, and plug connector on again.
- ___ 6. Install cable ties to ensure channel cable is at least six inches away from power supply.
- ___ 7. Remove 1KZH board from antistatic bag. Slide board into guide slots in card cage until board touches backpanel edgeboard connector.
- ___ 8. Seat board using board insertion tool.
- ___ 9. Remove 1KXH board from antistatic bag. Slide board into guide slots in card cage until board touches backpanel edgeboard connector.
- ___ 10. Seat board using board insertion tool.
- ___ 11. If channel being installed is not replacing another channel, do the following substeps, otherwise go to next question.
 - ___ a. Remove 1JYH board from antistatic bag. Slide board into guide slots in card cage until board touches backpanel edgeboard connector.
 - ___ b. Seat board using board insertion tool.

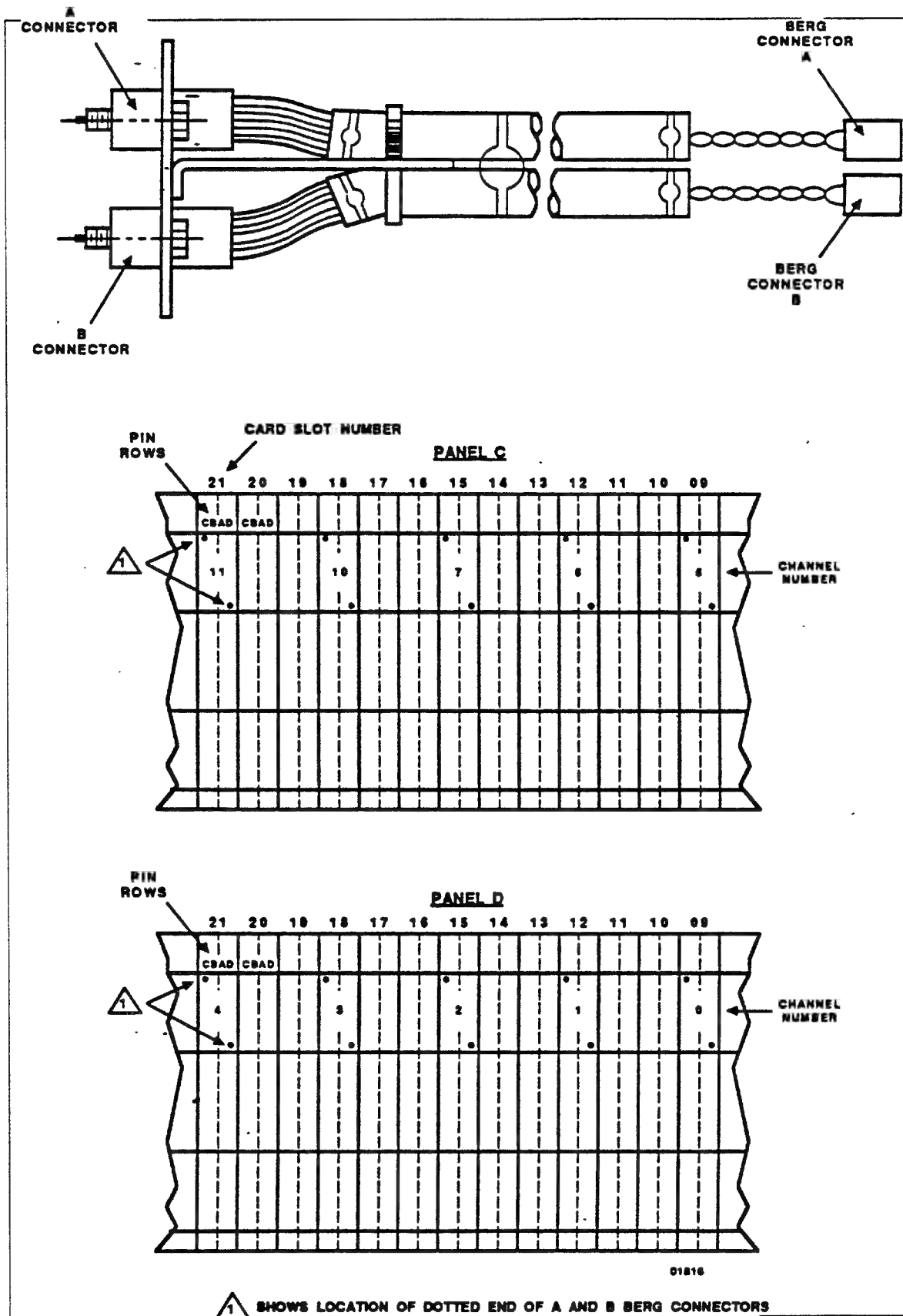


Figure 7-4. 170 Channel Berg Connector and Backpanel Pin Location

NOTE**IS CHANNEL AN ISI OR IPI?**

- *If yes, continue.*
- *If no, go to next procedure.*

-
- ___ 12. If installing ISI or IPI channels in locations for channel 5₈ through 11₈, remove factory-installed DMA-enhanced 170 adapter plates. Use Torx screwdriver or 1/4-in nutdriver to remove retaining screws.
 - ___ 13. Install ISI or IPI channel cable connector plates on connector panel using retaining screws supplied with cable.
 - ___ 14. Route channel cables to backpanel and install Berg connectors as follows:
 - ___ a. Position A Berg connector so dotted edge is up.
 - ___ b. Plug A Berg connector on to backpanel pins rows BA of channel location determined by figure 7-5. Top of connector plugs on to pin 9.
 - ___ c. Position B Berg connector so dotted edge is up.
 - ___ d. Plug B Berg connector on to backpanel pins rows BA of channel location determined by figure. Top of connector plugs on to pin 92.
 - ___ e. Ensure that no female contacts back out of connectors as connectors are pushed on to backpanel pins. If contact backs out of connector, remove connector, reseal contact, and plug connector on again.
 - ___ 15. Install cable ties to ensure channel cable is at least six inches away from power supply.
 - ___ 16. Remove Z board from antistatic bag. Slide board into guide slots in card cage until board touches backpanel edgeboard connector.
 - ___ 17. Seat board using board insertion tool.
 - ___ 18. Repeat steps 16 and 17 with X board.
 - ___ 19. If channel being installed is not replacing another channel, do the following substeps, otherwise go to next procedure.
 - ___ a. Remove 1JYH board from antistatic bag. Slide board into guide slots in card cage until board touches backpanel edgeboard connector.
 - ___ b. Seat board using board insertion tool.

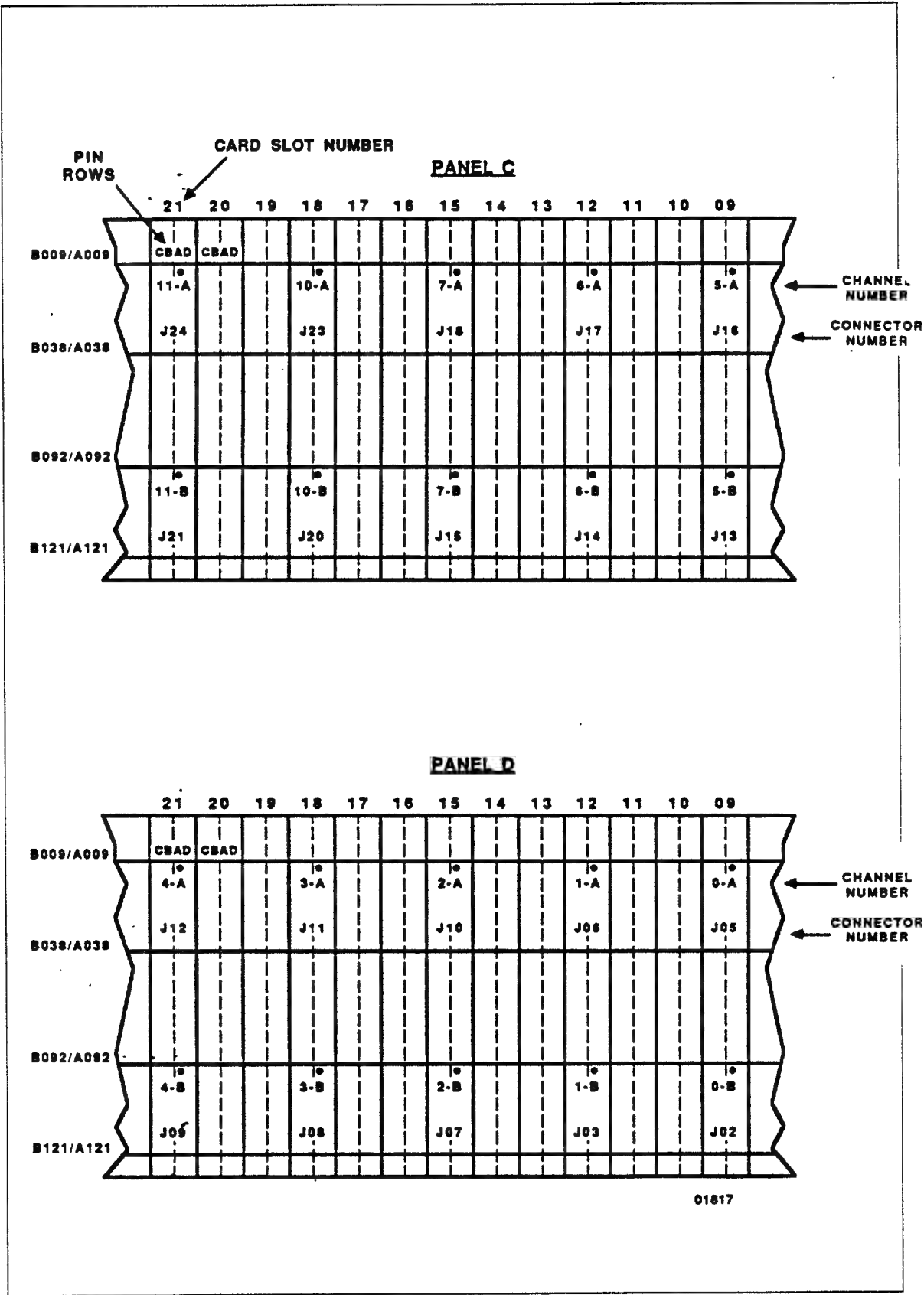


Figure 7-5. ISI/IPI Channel Backpanel Pin Location

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Install CIP	8-3
Verify Diagnostics	8-4
Check Warning Systems	8-14
Check CP Low-Temperature Sensor and SPM Cabling	8-16
Check IOU Low-Temperature Sensor and SPM Cabling	8-20
Check GH251-C WCU Low-Temperature Sensor and SPM Cabling	8-22
GH251-C WCU High Pressure Test	8-24
Check GH252-A/-C WCU Low-Temperature Sensor and SPM Cabling	8-26
GH252-A/-C WCU High Pressure Test	8-30
Run Network Operating System Validation Suite	8-34
Check Electromagnetic Compatibility	8-35
Install and Test Optional RTA Equipment	8-36

Performing the procedures in this chapter establishes a confidence level for determining that the central processor can run the operating system. The procedures are as follows:

- Install CYBER Initialization Package (CIP)
- Verify Diagnostics
- Check Warning Systems
 - Check CP Low-Temperature Sensor and SPM Cabling
 - Check CM and IOU low-temperature sensor and SPM cabling
 - Check GH251-C WCU unit warning cable to SPM
 - Check GH252-A/-C WCU unit warning cable to SPM
- Run network operation system validation suite
- Check electromagnetic compatibility
- Install and test optional RTA equipment

Tools/parts required:

- CIP tape
- CIP User's Handbook
- MSL 15X Off-line Maintenance Software Library Reference Manual
- Aerosol coolant
- Modem coupler
- Modem coupler cable

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Install CIP

Use this procedure to install the CYBER Initialization Package (CIP).

A CYBER initialization package, the CIP User's Handbook, and the MSL 15X Reference Manual are part of the central computer shipment to the computer site.

Procedure prerequisites

- Installers have read all bulletins and special instructions supplied with the CIP User's Handbook (listed on the About This Manual page).
- Installers are familiar with the CIP and have the capability to set test parameters and modify command buffers as necessary.
- System peripheral equipment is installed and operating.

Tools/parts required

- CIP tape with the latest FCO release and with the following:
 - Common Test and Initialization (CTI)
 - Maintenance Software Library (MSL)
 - Environmental Interface (EI)
 - Microcode
 - C (checkout) tape
- CIP User's Handbook (listed in the preface of this manual)
- MSL 15X Off-line Maintenance Software Library Reference Manual, listed in the preface of this manual

Procedure

- ___ 1. Update system date and time as follows:
 - ___ a. Check date and time with keyboard entry of *T (CR).
 - ___ b. Change date and time by entering *SYMMDDHHMM (CR).
Respectively, the entry requires year, month, day, hour, and minute.
- ___ 2. Refer to CIP User's Handbook, listed in preface of this manual, to install the CIP.
- ___ 3. Refer to MSL 15X Reference Manual for instructions on how to deadstart system and load Common Maintenance Software Executive (CMSE).
- ___ 4. Perform a deadstart by typing U,I,M (CR).

Verify Diagnostics

Use the following procedures to run diagnostics under normal conditions, without voltage and clock margins. Refer to figure 8-1.

Procedure prerequisites

- The CIP is installed on the system disk according to instructions supplied with the CIP package. It includes the C tape which contains internal Model Independent General Design Specification (MIGDS) checkout tests.
- The person performing this procedure has read all bulletins and special instructions supplied with the CIP package.
- The person performing these procedures is familiar with the CIP tapes and has the necessary software background to set test parameters and modify command buffers as necessary.

Procedure

NOTE

The following procedure runs CM, IOU, and CP tests under normal conditions (no logic or clock margins set).

- 1. Verify that CP, IOU, and CM logic voltages are set to 0 percent.
- 2. Verify that switches on master oscillator board at CM location A14 are set as follows:

For BS213-A CM (Bd. Loc. A14)	For BS137-A CM (Bd. Loc. F23)
S1 to CONT (down)	S1 to Cont (up)
S2 to CONT (down)	S2 to Cont (up)
S3 to NOM (middle)	S3 to NOM (middle)

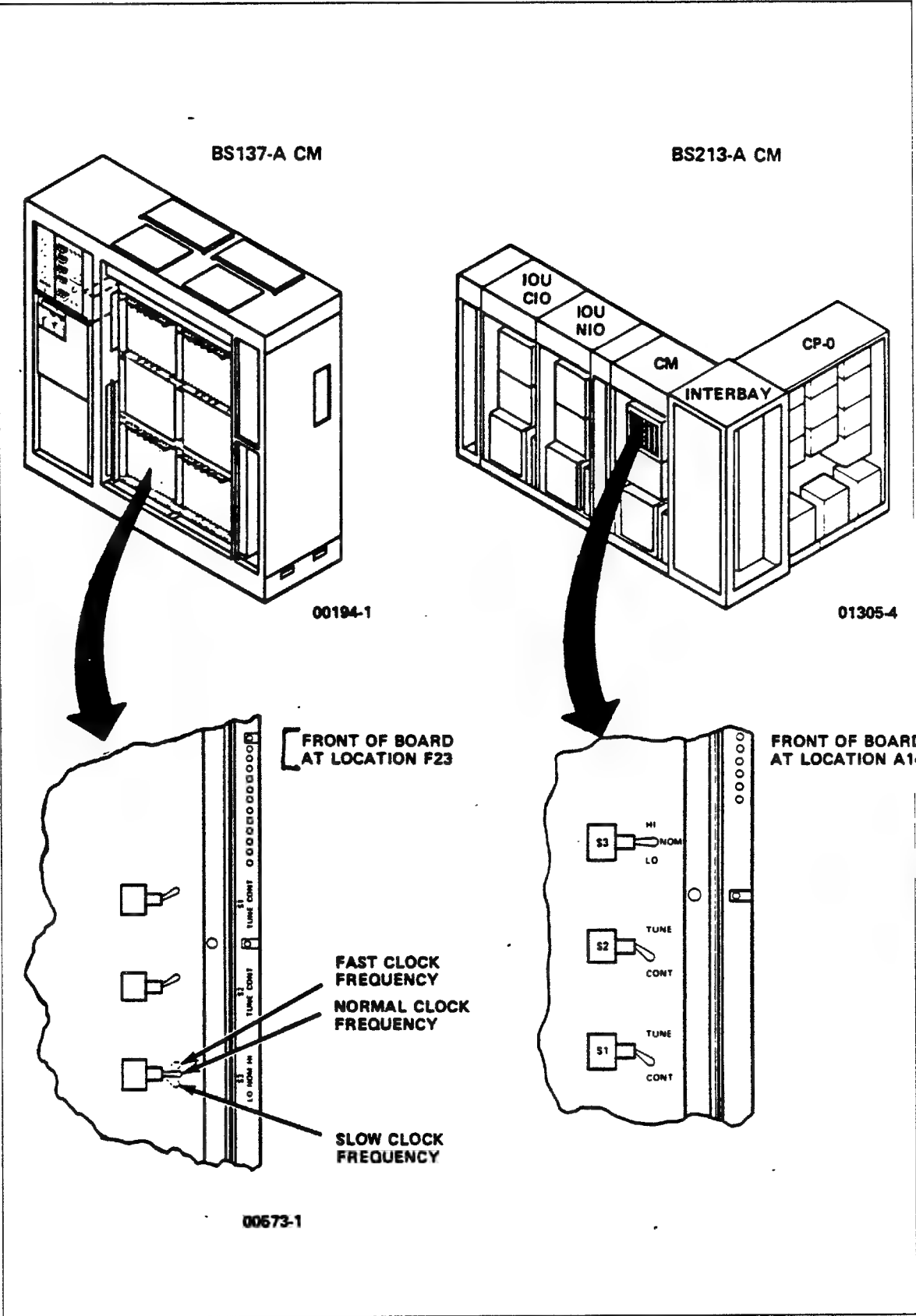


Figure 8-1. Master Oscillator Switch Locations

NOTE

IS IOU AN AB115-A?

- *If yes, skip to step 7.*
 - *If no, continue.*
-

___ 3. Initialize central computer as follows:

___ a. Verify that barrel and PPM configurations are set to 0.

___ b. If initializing is from a CC545 display station, press and release DEADSTART switch.

If initializing is from a CC634-B display station:

- ___ 1) Press and hold CTRL.
- ___ 2) Type G. Then release CTRL.
- ___ 3) Wait for message.
- ___ 4) Press and hold CTRL.
- ___ 5) Type R.

___ c. Type L (CR).

___ d. Select S option.

___ e. Select U option.

___ f. Select I option.

___ g. Select M option (CR).

If any problems occur, refer to MSL 15X Maintenance Software Reference Manual listed in the preface of this manual.

Press and hold CTRL and G.

Wait for message, Operator Access Enabled.

___ 4. Run tests in table 8-1 as follows:

___ a. Type GO,FII40 (CR). FII40 runs QLT40 through MRT40 in sequence. Total run time is approximately 1 min and 30 s.

NOTE

IS CP-1 PRESENT?

- *If yes, go to next question.*
 - *If no, go to substep 4b.*
-

___ b. Type GO,ALLMD3 (CR). ALLMD3 runs CMT3 through MAT3 in sequence. Run time varies depending on memory size.

Table 8-1. Single-CP System Diagnostic Tests

X	Command Buffer Name	Command Buffer Name	Test Type	Number of Passes	Comments
()	LDS/EDS			1	Each barrel.
()	QLT40			1	Automatically tests CIO.
()	PMT40			1	Automatically tests CIO.
()	EXT40			1	Automatically tests CIO.
()	PMU40			1	Automatically tests CIO.
()	CHD40	FII40	IOU	1	Automatically tests CIO.
()	CMA40			1	Automatically tests CIO.
()	MRA40			1	Automatically tests CIO.
()	MRT40			1	Automatically tests CIO.
()	ISI400		ISI CH00	1	Runs ISI4 channels individually; CIO PP0 - PP11.
()	ISI401		ISI CH01	1	
()	ISI402		ISI CH02	1	
()	ISI403		ISI CH03	1	
()	ISI404		ISI CH04	1	
()	ISI405		ISI CH05	1	
()	ISI406		ISI CH06	1	
()	ISI407		ISI CH07	1	
()	ISI408		ISI CH08	1	
()	ISI409		ISI CH09	1	
()	ISI410		ISI CH10	1	
()	ISI411		ISI CH11	1	
()	CISI4		ISI CH	1	Runs ISI4 DMA sections only, in all available CIO PPs.
()	CISI4L		ISI CH	1	Runs ISI4 DMA sections only, in CIO PPs in lower barrel.
()	CISI4U		ISI CH	1	Runs ISI4 DMA sections only, in CIO PPs in upper barrel.
()	MISI4		ISI CH	1	Runs ISI4 full test in all available CIO PPs.
()	MISI4L		ISI CH	1	Runs ISI4 full test in CIO PPS in lower barrels.
()	MISI4U		ISI CH	1	Runs ISI4 full test in CIO PPS in upper barrels.
()	SISI4		ISI CH	1	Runs ISI4 with maximum conflicts in all available CIO PPs.
()	SISI4L		ISI CH	1	Runs ISI4 with maximum conflicts in CIO PPs in lower barrels.
()	SISI4U		ISI CH	1	Runs ISI4 with maximum conflicts in CIO PPs in upper barrels.

(Continued)

Table 8-1. Single-CP System Diagnostic Tests (Continued)

X	Command Buffer Name	Command Buffer Name	Test Type	Number of Passes	Comments
()	CCA400		170 DMA CH00	1	Runs CCA4 (170DMA) in CIO PP0.
()	CCA401		170 DMA CH01	1	Runs CCA4 (170DMA) in CIO PP1.
()	CCA402		170 DMA CH02	1	Runs CCA4 (170DMA) in CIO PP2.
()	CCA403		170 DMA CH03	1	Runs CCA4 (170DMA) in CIO PP3.
()	CCA404		170 DMA CH04	1	Runs CCA4 (170DMA) in CIO PP4.
()	CCA405		170 DMA CH05	1	Runs CCA4 (170DMA) in CIO PP5.
()	CCA406		170 DMA CH06	1	Runs CCA4 (170DMA) in CIO PP6.
()	CCA407		170 DMA CH07	1	Runs CCA4 (170DMA) in CIO PP7.
()	CCA408		170 DMA CH08	1	Runs CCA4 (170DMA) in CIO PP8.
()	CCA409		170 DMA CH09	1	Runs CCA4 (170DMA) in CIO PP9.
()	CCA410		170 DMA CH10	1	Runs CCA4 (170DMA) in CIO PP10.
()	CCA411		170 DMA CH11	1	Runs CCA4 (170DMA) in CIO PP11.
()	CCCA4		170 DMA	1	Runs CCA4 DMA sections only, on all available CIO PPs.
()	CCCA4L		170 DMA	1	Runs CCA4 DMA sections only, on CIO PPs in lower barrels.
()	CCCA4U		170 DMA	1	Runs CCA4 DMA sections only, on CIO PPs in upper barrels.
()	MCCA4			1	Runs CCA4 full test in all available CIO PPs.
()	MCCA4L			1	Runs CCA4 full test in CIO PPs in lower barrels.
()	MCCA4U			1	Runs CCA4 full test in CIO PPs in upper barrels.
()	SCCA4			1	Runs CCA4 with maximum conflicts in all available.
()	SCCA4L			1	Runs CCA4 with maximum conflicts in CIO PPs in lower barrels.
()	SCCA4U			1	Runs CCA4 with maximum conflicts in CIO PPs in upper barrels.

(Continued)

Table 8-1. Single-CP System Diagnostic Tests (Continued)

X	Command Buffer Name	Command Buffer Name	Test Type	Number of Passes	Comments
()	CMT3			1	
()	MCT3			1	
()	CST3			1	
()	IFT3			1	
()	CTT3			1	
()	OIT3			1	
()	ACT3	ALLMD3	CP-0	1	
()	LMT3			1	
()	SMT3			1	
()	ANT3			1	
()	MDT3			1	
()	BPT3			1	
()	PDT3			1	
()	ICT3			1	
()	MAT3			1	

NOTE

IS CP-1 PRESENT?

- *If yes, go to substep 4c.*
 - *If no, go to next question.*
-

- ___ c. Type GO,ALLMD3A (CR). ALLMD3A runs CMT3 through MAT3 in sequence for CP-0.
- ___ d. Check off tests, and record any problems in space provided in table 8-2.
- ___ e. Type GO,ALLMD3B (CR). ALLMD3B runs CMT3 through MAT3 in sequence for CP-1.
- ___ f. Check off tests, and record any problems in space provided in table 8-2.
- ___ 5. Reload microcode, destroyed by ALLMD3 tests, as follows:
 - ___ a. Press and release DEAD START switch at display station.
 - ___ b. Select U option.
 - ___ c. Select I option.
 - ___ d. Select M option (CR).

NOTE

IS IOU AN AT478-A/AT481-A?

- *If yes, continue*
 - *If no, skip to next question*
-

- ___ 6. Run CIO Channel Tests (table 8-1) using the following sequences:
 - ___ a. Press and release DEADSTART switch at the CC545 display station or (if you have a CC634B display station): Press and hold CTRL and type G (wait for message). Press and hold CTRL and type R.
 - ___ b. Select S option.
 - ___ c. Select M option.
 - ___ d. Select CM communication and usage (for CIO operations). Type (8.3), then (CR) (CR).
 - ___ e. Run ISI4 (both barrels, all channels individually).
 - ___ f. Run HYDR (all channels).
 - ___ g. Run UHYD (all units.).

Table 8-2. Dual-CP System Diagnostic Tests

X	Command Buffer Name	Command Buffer Name	Test Type	Number of Passes	Comments
()	CMT3			1	
()	MCT3			1	
()	CST3			1	
()	IFT3			1	
()	CTT3			1	
()	OIT3			1	
()	ACT3	ALLMD3A	CP-0	1	
()	LMT3			1	
()	SMT3			1	
()	ANT3			1	
()	MDT3			1	
()	BPT3			1	
()	PDT3			1	
()	ICT3			1	
()	MAT3			1	
()	CMT3			1	
()	MCT3			1	
()	CST3			1	
()	IFT3			1	
()	CTT3			1	
()	OIT3			1	
()	ACT3	ALLMD3B	CP-1	1	
()	LMT3			1	
()	SMT3			1	
()	ANT3			1	
()	MDT3			1	
()	BPT3			1	
()	PDT3			1	
()	ICT3			1	
()	MAT3			1	

NOTE

Use the following steps to run quicklook tests. When run without error, these tests provide 90 percent confidence that the central computer can run the operating system.

NOTE

IS CP-1 PRESENT?

- *If yes, go to step 8.*
- *If no, go to step 6.*

- 7. Type GO,INSTALL (CR). INSTALL runs CP tests shown in table 8-3 in sequence. Total run time is approximately 30 min.

___ 8. Check off tests, and record any problems in table. Skip to step 12.

Table 8-3. Single-CP System Quick-Look Diagnostic Tests under Normal Conditions

X	Command Buffer Name	Command Buffer Name	Test Type	Number of Passes (Decimal)	Comments
()	TRAP3			1	
()	FCT93			1	
()	EXCH3			1	
()	CMEM3	INSTALA	CP-0	5	
()	EXC3			512	
()	R1FS3			458	
()	RCT2			724	
()	SNGL3			6	
()	PAGE3			3	
()	CRPT3			21	
()	TRAP3			1	
()	CMEM3	INSTALB	CP-1	1	
()	R1FS3			458	
()	RCT2			724	
()	SNGL3			6	
()	PAGE3			3	
()	CRPT3			21	

___ 9. Type GO,INSTALA (CR). INSTALA runs CP-0 tests shown in table 8-4 in a dual-CP system in sequence.

___ 10. Type GO,INSTALB (CR). INSTALB runs CP-1 tests shown in table 8-4 in a dual-CP system.

___ 11. Check off tests, and record any problems in table.

___ 12. Turn off all LED error indicators on IOU cards as follows:

___ a. Perform a deadstart.

___ b. Press m button to display maintenance option.

___ c. Enter CL (CR).

Table 8-4. Dual-CP System Quick-Look Diagnostic Tests Under Normal Conditions

X	Command Buffer Name	Command Buffer Name	Test Type	Number of Passes (Decimal)	Comments
()	TRAP3			1	
()	FCT93			1	
()	EXCH3 ¹			1	
()	CMEM3	INSTALA	CP-0	1	
()	EXC3			512	
()	RIFS3			458	
()	RCFS3			458	
()	RCT23			724	
()	SNGL3			6	
()	PAGES			3	
()	CRPT3			21	
()	TRAP3			1	
()	CMEM3	INSTALB	CP-1	1	
()	R1FS3			458	
()	RCFS3			458	
()	RCT23			724	
()	SNGL3			6	
()	PAGE3			3	
()	CRPT3			21	

Note:

1. EXCH3 must be run separately for each barrel of NIO. Use command buffer EXCH3L for lower barrel and EXCH3U for upper barrel.

Check Warning Systems

Checking the warning systems consists of the following tasks:

- Check CP-0 (and CP-1 if present) low-temperature sensor and SPM cabling.
- Check CM and IOU low-temperature sensor and SPM cabling.
- Check GH251-C WCU unit warning cable to SPM.
- Check GH252-A/-C WCU unit warning cable to SPM.

If unexpected results occur while performing these procedures, refer to the Power Distribution and Warning System Manual shown in the system publication index in the front of this manual to identify the problem.

Use figure 8-2 to relate FAULT and ON indicators on SPM to central processor columns and cabinets in the following steps.

- 1. A FAULT indicator is red when on, and indicates a fault from the column or unit being monitored. Indicators on the column or unit indicate the type of fault.
- 2. An ON indicator is green when on, and indicates the column or unit being monitored. To be monitored, a column or unit must be in the remote mode of operation.
- 3. FAULT and ON indicators for the MG and water cooling units (CHILLER) operate similar to those for the columns, and are identified by the labeling on the SPM.

Check CP Low-Temperature Sensor and SPM Cabling

Use this procedure for checking the low-temperature sensor in the CP-0 and CP-1 cabinets. Refer to figure 8-3.

NOTE

DOES SYSTEM USE AN SPM?

- *If yes, continue.*
 - *If no, go to next procedure*
-

Procedure prerequisites

- All previous installation and checkout procedures are complete.

NOTE

DOES YOUR SYSTEM USE AN MSL BINARY TAPE HAVING A RELEASE LEVEL OF 7 OR GREATER?

- *If yes, skip to step 2.*
 - *If no, go to step 1.*
-

Procedure

- ___ 1. Install C tape using TDX as follows:
 - ___ a. Select disk channel.
 - ___ b. Select tape channel.
 - ___ c. Select C option to load binaries for C test.
- ___ 2. Type AR PO (carriage return) at display station. CP maintenance registers appear on display station screen.
- ___ 3. Type BRO. IOU registers appear on right side of display station screen.
- ___ 4. Type DK (carriage return). This clears status summary register.
- ___ 5. Set mode switch on front of CP-0 column 1 power distribution box to REMOTE.
- ___ 6. Place a small piece of paper between light source and reflector on low-temperature assembly on CP-0 column 1 water supply pipe. Remove paper before 90 s to prevent removal of column 1 power. Observe the following while paper is in place.
 - ___ a. BACKUP LOW TEMP indicator on power distribution box lights.
 - ___ b. Horn sounds, and CP-0 column 1 warning light at SPM lights.
 - ___ c. Bit 63 in CP and bit 59 in IOU status summary registers set.
- ___ 7. Slide power supply back into CP-0 column 1. Install retaining screws.

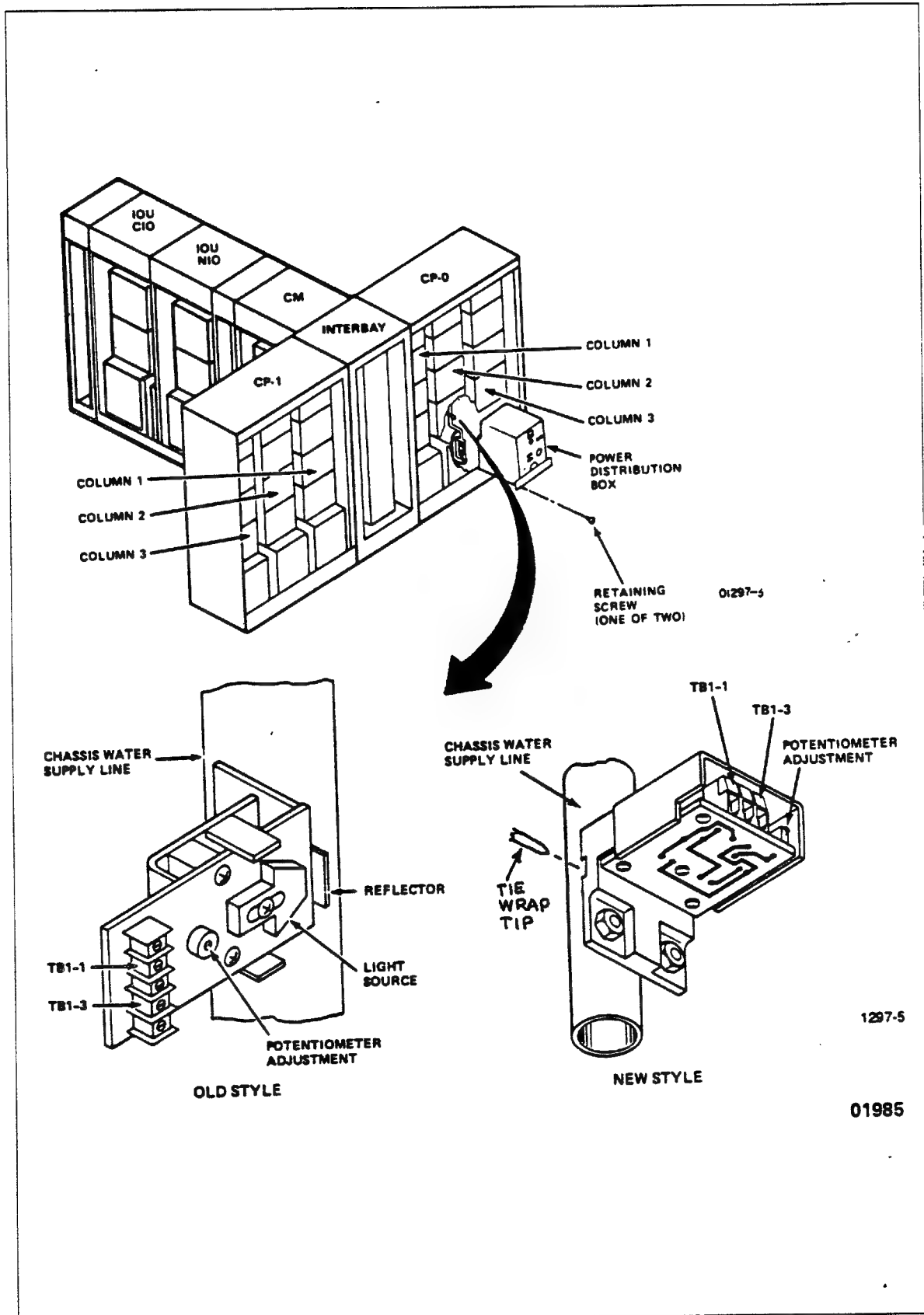


Figure 8-3. CP Low-Temperature Sensor

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- ___ 8. Repeat procedure for CP-0 column 2.
- ___ 9. Repeat procedure for CP-0 column 3.

NOTE

IS CP-1 PRESENT?

- *If yes, go to step 10.*
 - *If no, go to next procedure.*
-

- ___ 10. Repeat steps 1 through 9 for CP-1 with the following exception: In step 2, type AR P1 (carriage return) at display station.

Check IOU Low-Temperature Sensor and SPM Cabling

Use this procedure for checking the low-temperature sensor in the IOU cabinets. Refer to figure 8-4.

Procedure prerequisites

- All previous installation and checkout procedures are complete.

Procedure

- ___ 1. Place a small piece of paper between light source and reflector on low-temperature assembly on CM water supply pipe (for older style sensor). If newer style sensor is installed, insert tip of a tie-wrap (or equivalent) into notch on assembly to interrupt light source. Remove paper or tie-wrap tip within 30 s. to prevent removal of CM power. Observe the following while paper is in place.
 - ___ a. SPM horn sounds.
 - ___ b. SPM COLUMN 5 red indicator lights.
 - ___ c. LOW TEMP indicator on top of power distribution assembly lights.
 - ___ d. Bit 63 in CP and bits 63 and 59 in IOU status summary registers set.
- ___ 2. Repeat this procedure for IOU NIO cabinet.
- ___ 3. Repeat this procedure for the IOU CIO cabinet.

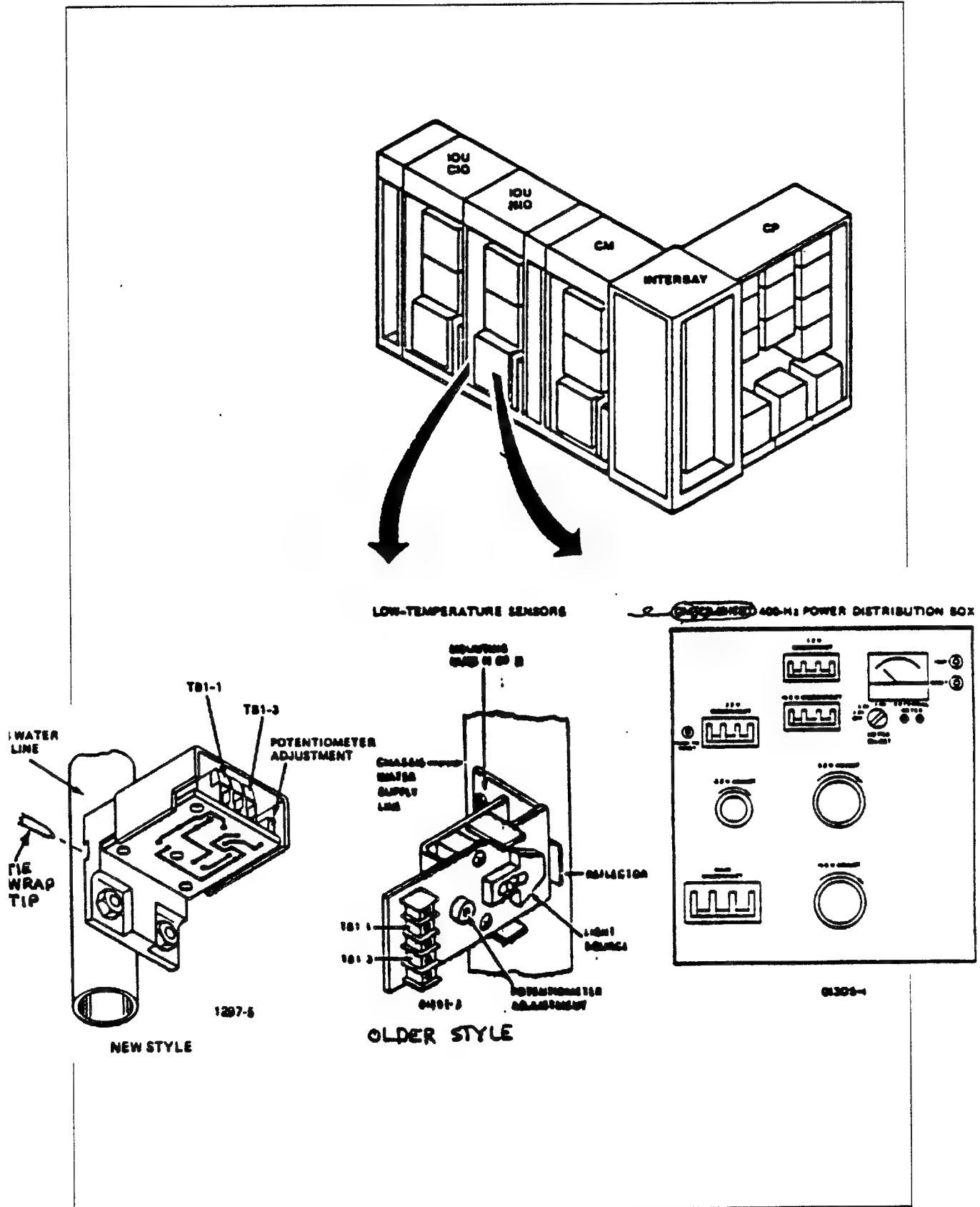


Figure 8-4. IOU Cabinet Low-Temperature Sensors

Check GH251-C WCU Low-Temperature Sensor and SPM Cabling

Use this procedure to check the low-temperature sensor in the WCU and the warning cable between the GH251-C WCU and the SPM. The procedure simulates a low-temperature condition in the WCU and therefore checks the warning cable to the SPM when the SPM responds with a proper warning. Refer to figure 8-5.

Procedure prerequisites

- Previous checkout procedure are completed.
- Water cooling unit is operating.

Procedure

- 1. With pump running, insert a piece of paper between light source and reflector (for old style sensors) or a tie-wrap or something similar in the slotted groove at the bottom of the sensor (between the pipe and the light source on new style sensors).
- 2. Observe the following reactions:
 - LOW TEMP fault indicator lights.
 - Pump stops running approximately eight seconds after fault was detected.
 - CHILLER light goes out on SPM.
- 3. If reactions in step 2 did not occur, perform Low Temperature Fault Adjustment procedure for GH251-C in Cooling System HMM, publication number 60461610.
- 4. Remove piece of paper or tie-wrap and switch the INPUT POWER DISCONNECT circuit breaker off and on again. Indicator goes out and pump starts.

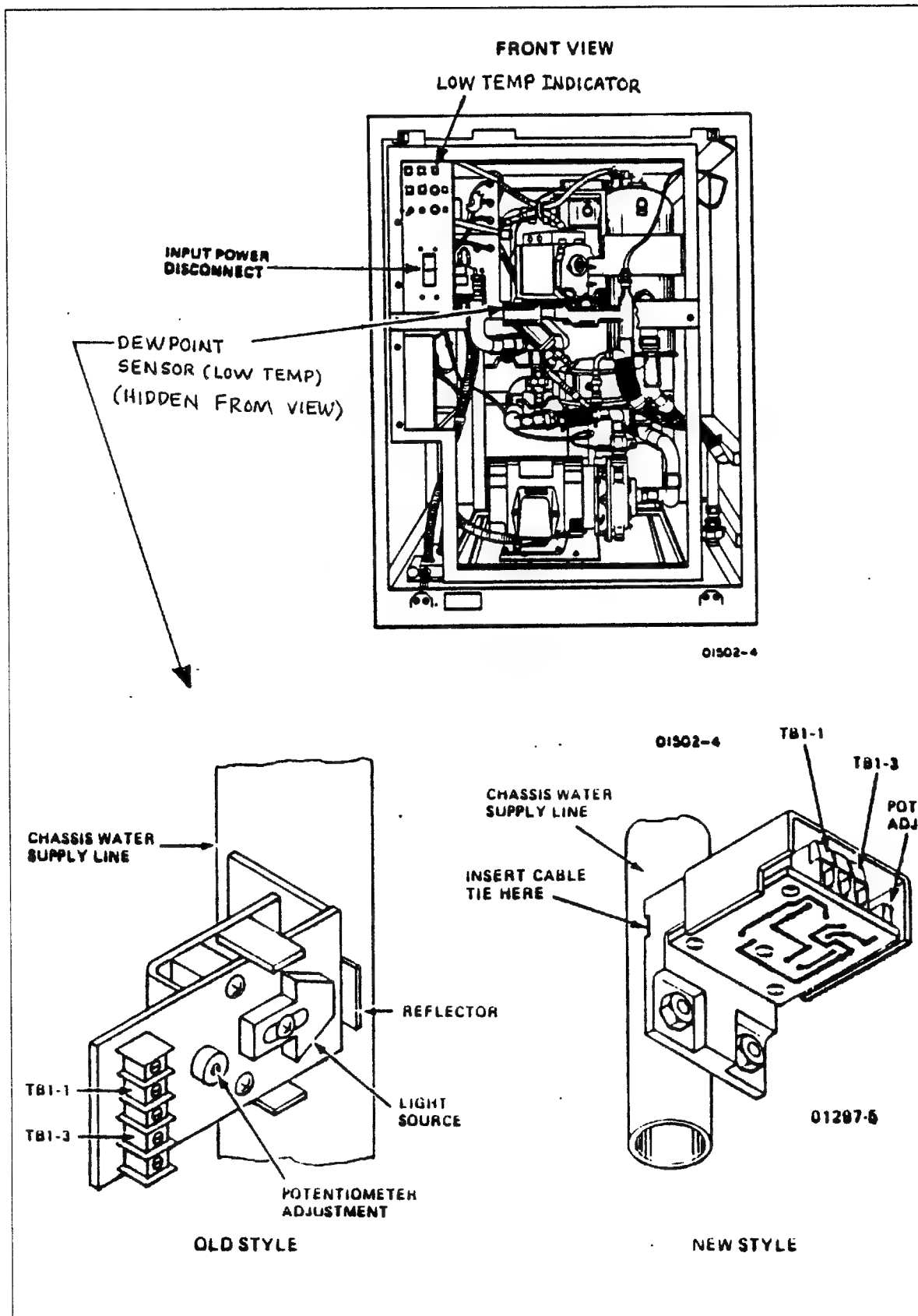


Figure 8-5. GH251-CWCU Low Temperature Fault Check

GH251-C WCU High Pressure Test

Use this procedure to test the high pressure protection circuit for pump outlet pressure. The protection circuit activates at 28 kPa (4 psi) less than the maximum pump outlet pressure. Refer to figure 8-6.

Procedure Prerequisites

- Water cooling unit is operating and all other Prepare Water Cooling Unit procedures have been completed.

Procedure

- ___ 1. Set mode switch to LOCAL.
- ___ 2. Slowly close water pump outlet valve while pump is running. Pump pressure rises on PUMP OUTLET PRESSURE gauge.
- ___ 3. Observe the following reactions:
Water cooling unit HIGH WATER PRESS indicator lights; eight seconds after fault is detected, the pump stops.
- ___ 4. Fully open water pump outlet valve.
- ___ 5. If reactions in step 3 did not occur, perform GH251-C WCU High Pressure Switch Adjustment procedure in chapter 5 of this manual. Then repeat test.
- ___ 6. Reset WCU by switching INPUT POWER DISCONNECT circuit breaker off and then on again. Water pump starts and water cooling unit HIGH WATER PRESS indicator goes out.
- ___ 7. Set mode switch to REMOTE.

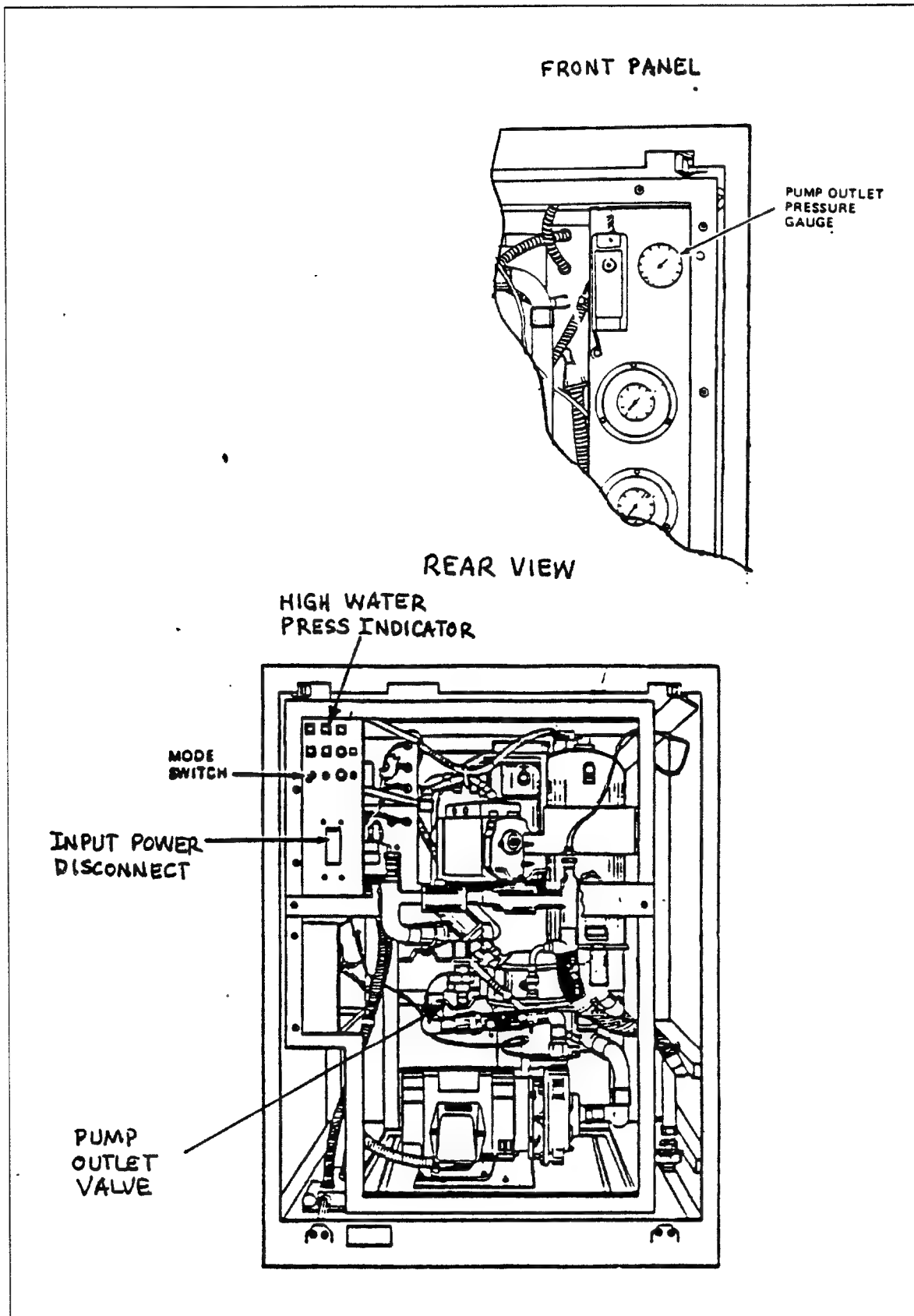


Figure 8-6. GH251-C WCU High Pressure Test

Check GH252-A/-C WCU Low-Temperature Sensor and SPM Cabling

Use this procedure to check the low-temperature sensor in the WCU and the warning cable between the GH252-A/-C WCU and the system power monitor (SPM). The procedure simulates a low-temperature condition in the water cooling unit and therefore checks the warning cable to the SPM when the SPM responds with the proper warning. Refer to figures 8-7 and 8-8.

NOTE

IS GH252-A OR GH252-C WCU PRESENT?

- If yes, continue.
 - If no, ensure that checks for GH251-C have been completed and continue with next procedure.
-

Procedure prerequisites

- Previous checkout procedures are complete.
- Water cooling unit is operating.

Procedure

- 1. Remove front panel from water cooling unit if not previously removed.
- 2. Set mode switch on water cooling unit to REMOTE. This can be done while unit is operating.
- 3. Turn keyswitch on left side of SPM to LOCAL. This can be done while SPM is operating.
- 4. Set selector switch on SPM to CHILLER.
- 5. Set function switch on SPM to CHILLER 1. UNIT digital display on SPM indicates C1 (chiller 1). DATA digital display on SPM indicates CP-0, CMC, CM, and IOU chassis water temperature. This temperature should be within $\pm 2^{\circ}\text{F}$ of temperature indicated on water cooling unit CHASSIS WATER TEMPERATURE gauge.

NOTE

- Use step 6 for WCUs having an older type low-temperature sensor.
 - Use step 7 for WCUs having a newer type low-temperature sensor.
-
- 6. Insert a piece of paper between light source and reflector on low-temperature assembly in water cooling unit. A fault indication occurs at water cooling unit and SPM indicators. Lighted fault indicator at SPM indicates a proper warning line connection between water cooling unit and SPM.
 - 7. Insert cable tie into notch on low-temperature assembly as shown on figure to interrupt light source. A fault indication (repeat from step 6 to end of step).

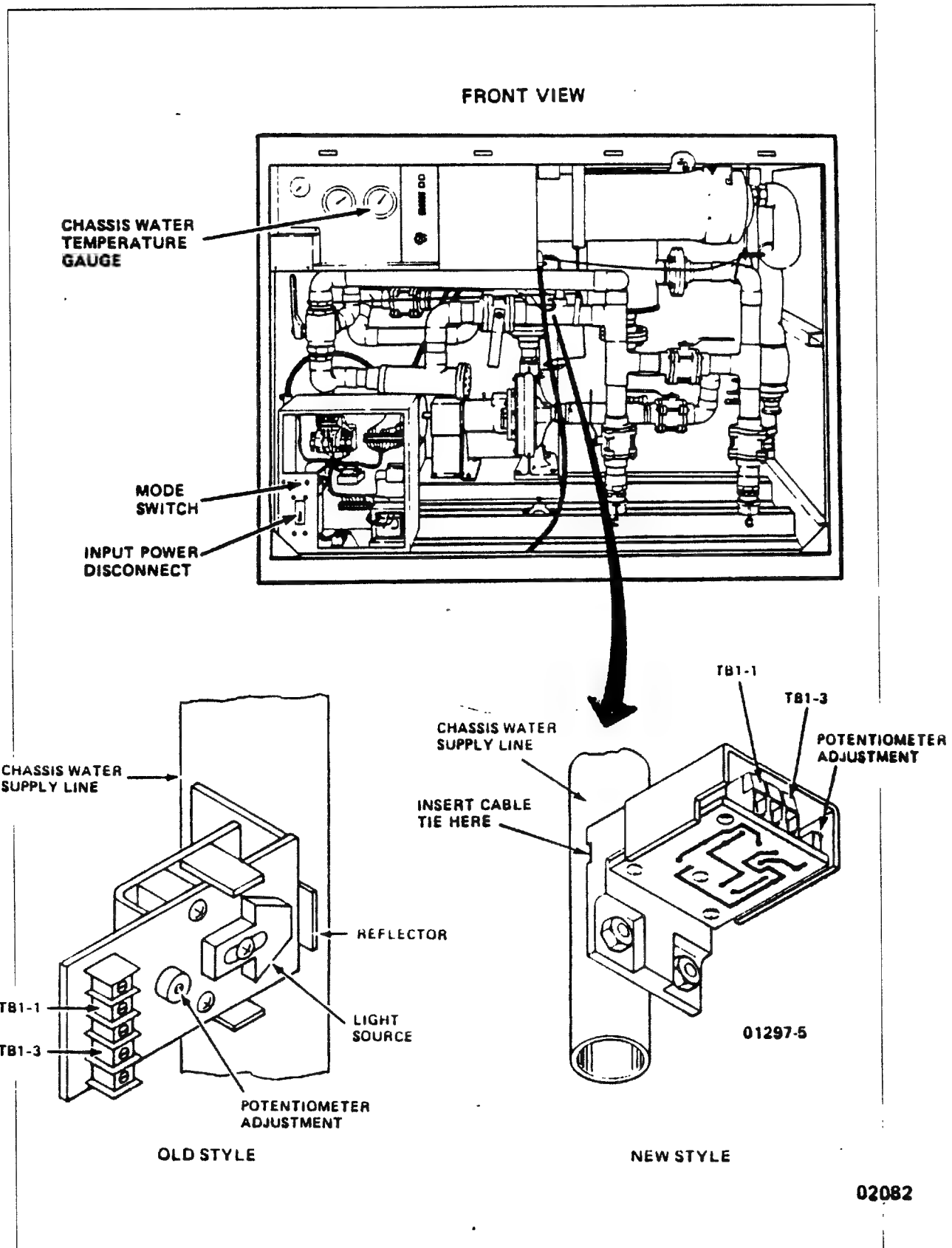


Figure 8-7. GH252-A WCU Low-Temperature Sensor Check

- ___ 8. Install panels on water cooling unit.
- ___ 9. Record time on flowchart for checking warning systems.

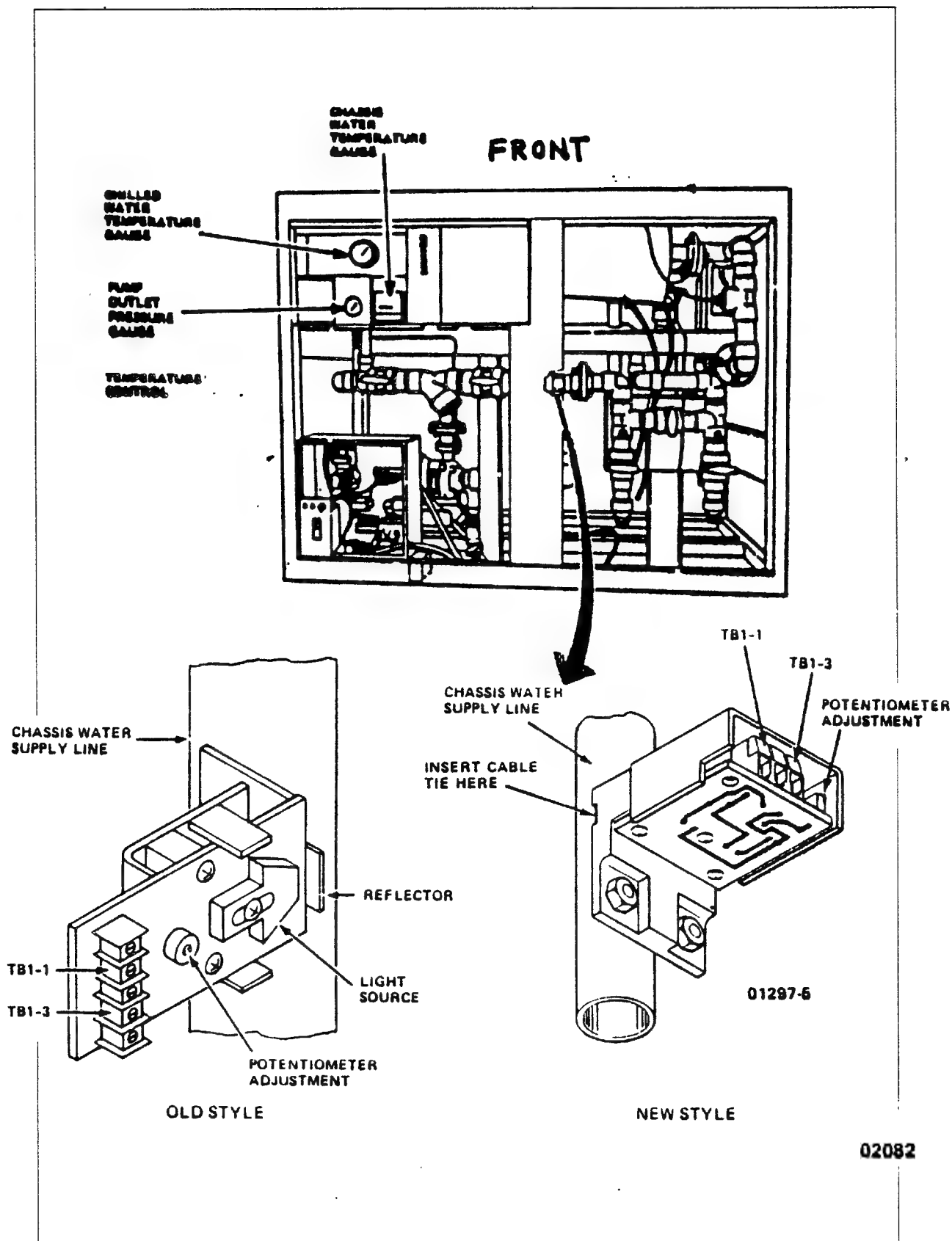


Figure 8-8. GH252-C WCU Low-Temperature Sensor Check

GH252-A/-C WCU High Pressure Test

Use this procedure to test the high pressure protection circuit for pump outlet pressure. Refer to figures 8-9 or 8-10.

Procedure prerequisites

- Water cooling unit is operating.

Procedure

1. Observe PUMP OUTLET PRESSURE gauge on water cooling unit.

Gauge indicates:

	50-Hz Units	60-Hz Units
GH252-A	173 through 241 kPa (25 through 25 psi)	276 through 379 kPa (40 through 55 psi)
GH252-C	241 through 314 kPa (35 through 45 psi)	331 through 428 kPa (48 through 62 psi)

2. Set mode switch to LOCAL.
3. Slowly close pump outlet valve while pump is running. Pump pressure rises.
4. Monitor PUMP OUTLET PRESSURE gauge. When gauge indicates 14 kPa (2 psi) less than maximum pump outlet pressure (for either WCU), verify that the following reactions occur:
 - CHILLER fault indicator on SPM lights and alarm sounds.
 - HIGH PRESSURE indicator on WCU lights and water pump stops after five seconds.
5. If pump does not stop when gauge indicates 14 kPa (2 psi) less than maximum pump outlet pressure, perform GH252-A/-C High Pressure Switch Adjustment procedure in chapter 6.
6. Fully open water pump outlet valve.
7. Reapply power to WCU and verify that reactions occur, as follows:
 - Press and release FAULT RESET ON WCU control panel. HIGH PRESS indicator clears on WCU control panel.
 - SPM CHILLER fault clears, alarm stops, and water pump starts.
8. Set mode switch to REMOTE. Water pump continues operating.

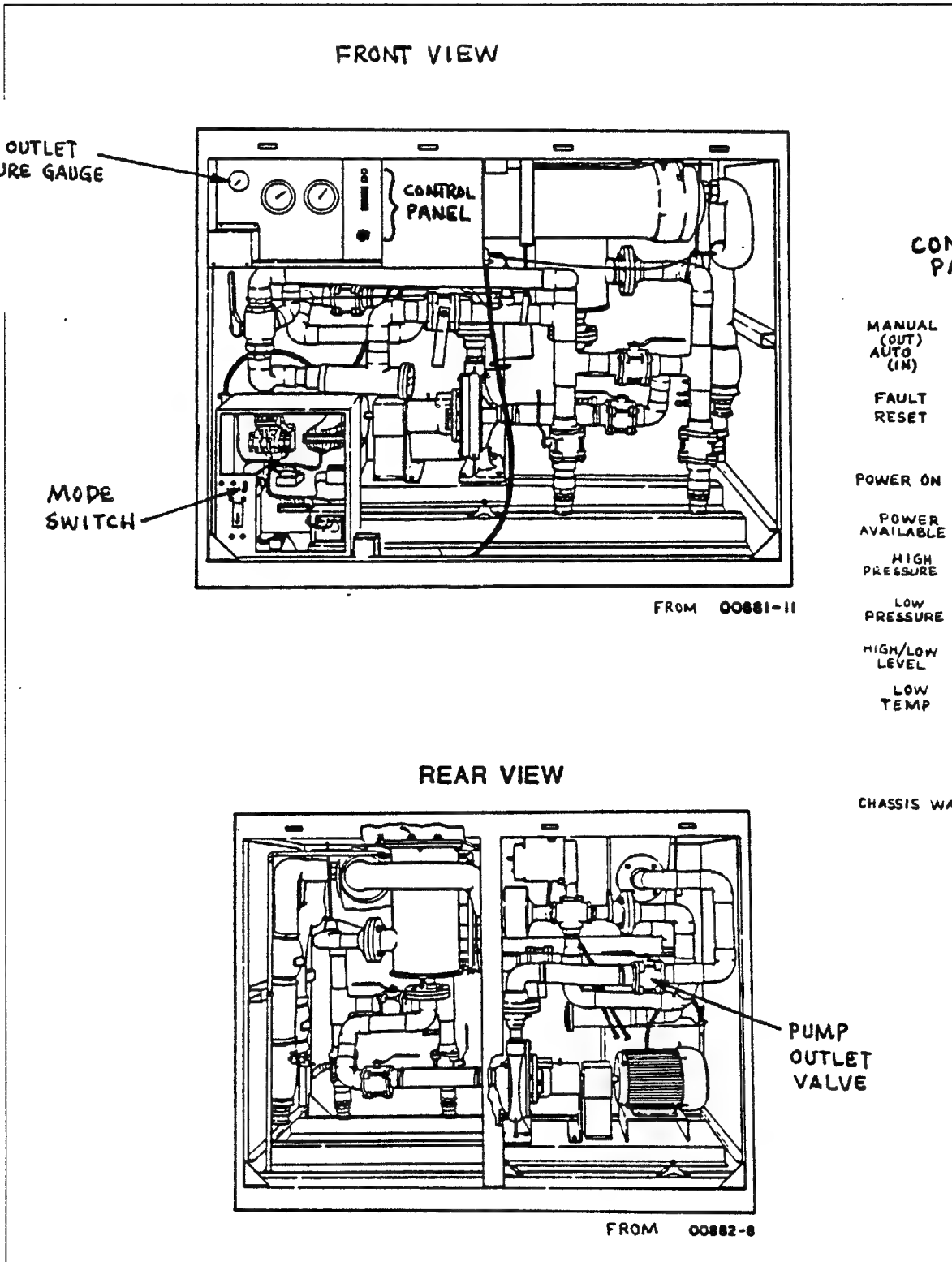


Figure 8-9. GH252-A WCU High Pressure Test

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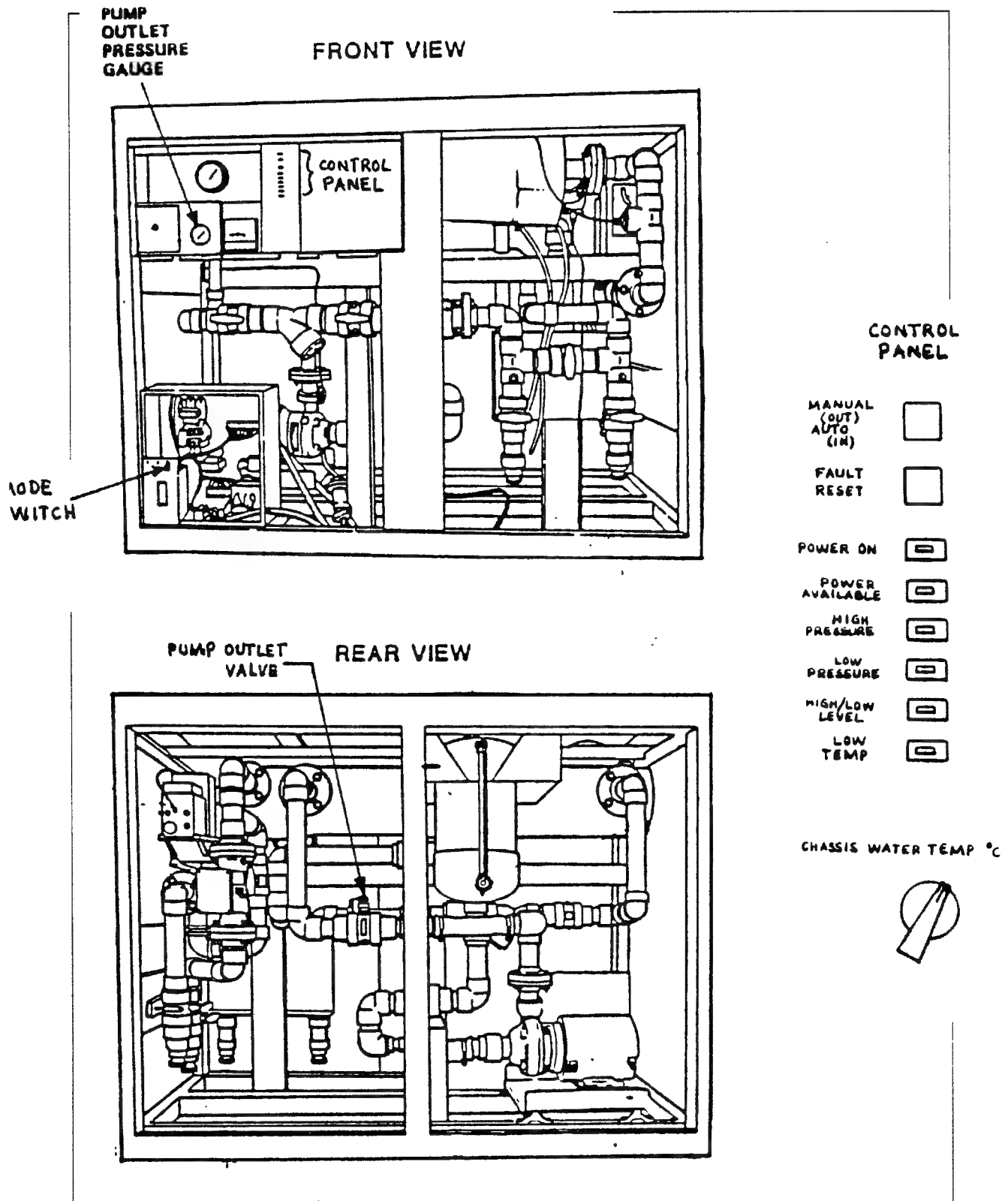


Figure 8-10. GH252-C WCU High Pressure Test

Run Network Operating System Validation Suite

Refer to the NOS and NOS/VE System Validation Suite User's Guide to test CYBER 180 mainframe hardware features in a NOS/VE operating system environment.

Check Electromagnetic Compatibility

Refer to Computer Automated Maintenance Scheduling (CAMS) 11 MIFTAPE (PN 12322211), and perform GRND procedures to test the electromagnetic compatibility (EMC) of the central computer.

Install and Test Optional RTA Equipment

NOTE

Refer to the Remote Terminal Assistance (RTA) Handbook listed on the Related Manuals page of this manual for installation and testing procedures for all two-port multiplexer and RTA equipment.

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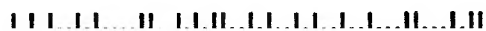
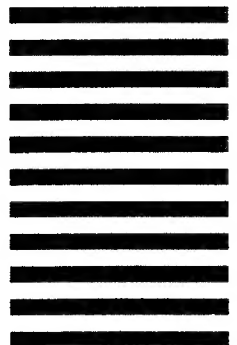
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